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ABSTRACT

This report contains aggregate data on costs for all schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, and nursing, and the average education costs per student in these fields for a sample of schools during the 1972-73 academic year. Context for the study is provided by an appraisal of the educational institutions in the aggregate: (1) More than 1,600 schools in the United States provide education in the eight professions. (2) The schools spent more than $3 billion in the education of more than 30,000 students in 1972 but received less than 40% of their income from unrestricted education funds. (3) Two-thirds of all health professional students are in nursing. The other seven professions in 1973 graduated 22,900 students with the first professional degree. (4) Health professional schools vary greatly in their curricula, mixture of students, organization, and financial structure. (Author/MJM)

ED 090893

REPORT OF A STUDY

Costs of Education in the Health Professions

PARTS I AND II

January 1974

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INSTITUTE OF MEDICINE

REPORT OF A STUDY

Costs of Education in the Health Professions

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U.S. DEPARTMENT of
HEALTH, EDUCATION, and WELFARE
PUBLIC HEALTH SERVICE
HEALTH RESOURCES ADMINISTRATION
Bureau of Health Resources Development
Bethesda, Md.

NATIONAL
ACADEMY of
SCIENCES
Washington, D.C.

NOTICE

This is the report of a project undertaken with the approval of the Councils of the Institute of Medicine and of the National Academy of Sciences. Such approval manifests the judgment that the project is of national importance and appropriate both to the purposes and professional resources of the Institute of Medicine.

The members of the committee appointed to conduct the project and prepare the report were selected for recognized competence and with due consideration for the balance of disciplines appropriate to the project. Responsibility for the substantive aspects of the report rests with that committee.

Each report issuing from a study committee of the Institute of Medicine is reviewed by an independent group of qualified individuals according to procedures established and monitored by the National Academy of Sciences. Only upon satisfactory completion of the review process is distribution of a report approved.

INSTITUTE OF MEDICINE

COSTS OF EDUCATION IN THE HEALTH PROFESSIONS

Report of a Study
Parts I and II

January 1974

Supported by U.S. Department of Health, Education, and Welfare
Contract No. NIH-PH-43-64-44

National Academy of Sciences
Washington, D.C.

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
OFFICE OF THE PRESIDENT

February 26, 1974

The Honorable Harrison A. Williams, Jr.
Chairman
Committee on Labor and Public Welfare
United States Senate
Washington, D.C. 20510

Dear Senator Williams:

I am pleased to present to the Senate Committee on Labor and Public Welfare a report on a study undertaken by the Institute of Medicine of the National Academy of Sciences to determine the national average annual per student costs of education in eight health professions. The study was performed under a contract with the Department of Health, Education, and Welfare pursuant to the provisions of the Comprehensive Health Manpower Act of 1971, PL 92-157, Sec. 205. These provisions request the Secretary of Health, Education, and Welfare to arrange for studies to determine the average annual costs of educating students in the schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine and nursing.

The enclosed report is in two parts. Part I contains the summary of findings and recommendations. Part II includes a legislative history of the support of health professional education, aggregate data on the health professional schools, the costs of education and variations in costs in each of the eight fields, and a discussion of capitation support as a means of financing health professional education. Part II also contains a chapter for each of the professions describing in detail the cost data developed during the study.

Part III of the report, which is a technical description of the methodology used to collect and analyze the data, will be transmitted within the next two months.

We shall be glad to discuss this report in greater detail with the members and staff of your committee.

Sincerely yours,

John R. Hogness

John R. Hogness, M.D.
President

Enclosure

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
OFFICE OF THE PRESIDENT

February 26, 1974

The Honorable Harley O. Staggers
Chairman
Committee on Interstate and Foreign Commerce
United States House of Representatives
Washington, D.C. 20515

Dear Mr. Staggers:

I am pleased to present to the House Committee on Interstate and Foreign Commerce a report on a study undertaken by the Institute of Medicine of the National Academy of Sciences to determine the national average annual per student costs of education in eight health professions. The study was performed under a contract with the Department of Health, Education, and Welfare pursuant to the provisions of the Comprehensive Health Manpower Act of 1971 PL 92-157, Sec. 205. These provisions request the Secretary of Health, Education, and Welfare to arrange for studies to determine the average annual costs of educating students in the schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine and nursing.

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Sincerely yours,

John R Hogness

John R. Hogness, M.D.
President

Enclosure

NATIONAL ACADEMY OF SCIENCES
2101 CONSTITUTION AVENUE
WASHINGTON, D. C. 20418

INSTITUTE OF MEDICINE
OFFICE OF THE PRESIDENT

February 26, 1974

The Honorable Caspar W. Weinberger
Secretary of Health, Education, and
Welfare
North Building, Room 5246
330 Independence Avenue, S.W.
Washington, D.C. 20201

My dear Mr. Secretary:

I am pleased to present to the Department of Health, Education, and Welfare a report on a study undertaken by the Institute of Medicine of the National Academy of Sciences to determine the national average annual per student costs of education in eight health professions. The study was performed under a contract with the Department of Health, Education, and Welfare pursuant to the provisions of the Comprehensive Health Manpower Act of 1971, PL 92-157, Section 205. These provisions request the Secretary of Health, Education, and Welfare to arrange for studies to determine the average annual costs of educating students in the schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine and nursing.

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We shall be glad to discuss the report in greater detail with your staff.

Sincerely yours,

John R. Hogness

John R. Hogness, M.D.
President

Enclosures

INSTITUTE OF MEDICINE

Study of the Costs of Education in the Health Professions

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FOREWORD

The rapid growth of health professional education in the United States since World War II has been accompanied by an increasing complexity of the educational institutions and of the financing of their programs. In the mid-1950s, some pioneering efforts to determine the costs of education, research, and health services were undertaken by Augustus J. Carroll in his study, *The Costs of Medical Education*. Since then, several institutional and professional organizations, including the Association of American Medical Colleges, have attempted to bring up to date education cost analyses and expand them to various other health professions.

A need for further examination of costs was recognized by Congress in the process of enacting legislation to support health professional education. The 1971 Comprehensive Health Manpower Act directed the Secretary of Health, Education, and Welfare to arrange for a study by the National Academy of Sciences. This report by the Institute of Medicine/NAS is the result of that Congressional request.

The president and Council of the Institute of Medicine assembled an interdisciplinary Steering Committee for the study at the same time as staff was being recruited--to meet an impossibly short deadline of 18 months for a final report.

As chairman of the Steering Committee, I wish to express my deep appreciation to its members, who interrupted busy schedules to respond to many requests for guidance and attend many meetings. I also wish to express appreciation to the eight advisory panels who reviewed the organization and progress of the study in the eight professions.

The study was conducted by the staff, under the direction of Mrs. Ruth S. Hanft. The Steering Committee is incalculably grateful to the staff, who have been unusually resourceful. It is not immodest for the members of the committee to note that the staff has advanced the concepts and methodology of education cost determination in the course of this study.

We hope that this report will be of aid to the Congress in devising effective mechanisms for financial support of health professional education, which is the keystone for the delivery of health care to all of our citizens.

Julius B. Richmond, M.D.

Chairman, Steering Committee

Study on Costs of Education
in the Health Professions

* * * * *

The individuals who aided in this study are too numerous for adequate acknowledgment. The Institute of Medicine's study staff wishes first to thank the Steering Committee, whose members were always available to us for policy guidance, assistance, and advice, and devoted many long hours to the study. The work of the staff reflects the frequent contact with the members of the Steering Committee individually and as a group.

Without the fullest cooperation of the schools that participated in the study, the data could not have been obtained. Other invaluable sources of advice were the advisory panels of the eight professions and the professional associations, all of whom freely contributed to an understanding of their fields and educational processes.

Special mention is due the participants in the constructed costs seminars, who were unstinting of their time and expertise in arriving at the judgments of required education resources. The study group also is grateful to the Department of Health, Education, and Welfare, the Health Resources Administration, and the National Institutes of Health for providing background information of Federal fiscal obligations and manpower data in the health fields.

Ruth S. Hanft

Study Director

Preface

Costs of health professional education have long been topics of discussion among educators, members of professional associations, and Federal and state officials. The complexity of many health professional schools and the interrelationships between teaching, research, and patient care in the educational process make cost determination both difficult and controversial. Data are scarce on costs per student and on aggregate costs for the institutions in all of the health professions. Costs appear to vary greatly in all of the professions but there are few explanations for the variation. Recent increases in public financial support of health professional education have prompted a concerted effort toward a better understanding of education costs.

The Comprehensive Health Manpower Act of 1971 (Public Law 92-157) introduced a new method of Federal aid for education in the health professions: direct payments to schools on the basis of their enrollment, or "capitation" grants. Congress, desiring information for its deliberations on the amounts of capitation payments, asked the Institute of Medicine/National Academy of Sciences, to provide estimates of the education costs per student in each of the eight health professions covered by the Act.

This report presents the information requested by Congress in a series of legislative charges set forth in Section 205 of the Act.

> *Sec. 205 (a) (1) The Secretary of Health, Education, and Welfare...shall arrange for the conduct of a study or studies to determine the national average annual per student educational cost of schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, and nursing in providing education programs which lead, respectively, to a degree of doctor of medicine, a degree of doctor of osteopathy, a degree of doctor of dentistry (or an equivalent degree), a degree of doctor of optometry (or an equivalent degree), a degree of bachelor of science in pharmacy (or an equivalent degree), a degree of doctor of podiatry (or an equivalent degree), a degree of doctor of veterinary medicine (or an equivalent degree), a certificate or degree or other appropriate evidence of completion of a course of training for physicians assistants or dental therapists, or a certificate or degree certifying completion of nurse training.*

This report contains aggregate data on costs for all schools of medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, and nursing, and the average education costs per student in these fields for a sample of schools during the 1972-73 academic year.

Physicians' assistants and dental therapists were not studied for this report because educational programs in those categories are still in a developmental stage.

The study determined the costs of education toward the first professional degree in the eight health fields. There are many other health professional education programs, including masters and doctoral degrees in public health, physiotherapy, and medical social work, which were not included in the Congressional charge and therefore not studied for this report.

> *(2) Such studies shall be completed and an interim report thereon submitted not later than March 30, 1973, and a final report not later than January 2, 1974, to the Secretary, the Committee on Interstate and Foreign Commerce of the House of Representatives.*

An interim report was submitted to the Congress in March, 1973. The report presented in the following chapters is the final report of the study.

> *(3) Such studies shall develop methodologies for ascertaining the national average annual per student educational costs and shall, on such basis, determine such costs for school years 1971-72, 1972-73, and the estimated costs for school years 1973-74 in the respective disciplines. The study shall also indicate the extent of variation among schools within the respective disciplines in their annual student education costs and the key factors affecting this variation. The studies shall employ the most recent data available from the health professional schools in the country at the time of the study.*

A consistent methodology to define average education costs per student has been developed by the study group. The methodology yields historical costs: what is, rather than what should be. They are average costs, not marginal or incremental costs.

The report presents *education costs* and *net education expenditures* for the school year 1972-73. Education costs are the total cost of all resources required to educate the student. They include costs of instruction and costs of research and patient care activities considered essential to education. Net education expenditures are education costs less the portion of those costs that are covered by income from research or patient care. Net education expenditures can be used to identify a school's need for financial support of the educational program.

The Congressional charge requests cost information for school years 1972, 1973, and 1974. This report contains cost data only for 1973 because the methodology used in the study is based primarily on the way faculty spent their time, and this information was obtained only for part of Fiscal Year 1973 due to the time limits for conducting the study. It is the judgment of the study group that applying the faculty time data for one year to actual expenditures incurred in another year and then using the resulting cost estimate for both years would not accurately reflect resource costs for a given year. Health professional schools are undergoing rapid changes in patterns of financing, which affect their resources. Prediction of their future expenditures is uncertain because of instability in sponsored patient care and research programs.

The study group gathered and analyzed data by undertaking field studies at 82 schools in the eight professions to determine the amount of time spent by faculty and house staff in activities relevant to education. From these data the costs of education, research, and patient care were developed for each of the sample schools. Seminars were conducted in medicine, dentistry, and veterinary medicine to help define the essential components of education. The ranges of education costs in the sampled schools were ascertained, and the main reasons for cost variation among schools in any particular profession were identified.

Concerning the variation in costs, no conclusions should or could be drawn as to the quality of the education received or the quality of the graduate. This study measured only costs, not processes, effectiveness, or quality.

The sample of schools drawn in certain of the professions is small in relation to the wide diversity of institutions. The sample in many professions was not random, but was chosen by a factor/cluster analysis described in the methodology (Part III). Because of the diversity of the schools and the use of clustering and factor analysis instead of a random sample, no conclusions are possible concerning statistical errors. The circumstance that the data are based on individual time logs during one short period makes their validity greatly dependent on the accuracy of the faculty in recording time and the representativeness of the period selected.

It is the opinion of the study group, however, that the sample is generally representative and that time log activity analysis is a sound methodology. Follow-up surveys at a subsample of institutions indicated that the chosen time periods are sufficiently representative of school activities during the academic year.

> *(4) Such studies shall also describe national uniform standards for determining annual per student educational costs for each health professional school in the future years and estimates of the cost to such schools of reporting according to these uniform standards.*

The faculty activity analysis and cost allocation methodology developed and field tested in this study can be adapted as a national uniform method for determining future average annual education costs per student in health professional schools. The methodology, currently being refined for use by health professional schools, is described in Part III of this report. The study group is developing a manual to provide a detailed description of the cost-finding methodology and the cost of its implementation by the schools.

> *(5) The report shall also include recommendations concerning how the Federal Government can utilize educational cost per student data to determine the amount of capitation grants under the Public Health Service Act to each health professional school.*

The study group is cognizant of a national discussion regarding different methods of financing higher education and health professional education. Possible methods include institutional support, with alternative forms such as capitation, distress grants, and special project grants; and also various types of student aid. The study group concluded that judgments on the relative merits of financing methods would exceed the Congressional charge, and that the time limits of the study did not permit sufficient analysis for comment on financing programs other than capitation. In its consideration of capitation financing, the study group computed the amount of such grants at different levels of net education expenditures for each of the professions.

Organization of the Study and the Report

A steering committee of the Institute of Medicine/National Academy of Sciences was appointed to provide policy guidance and direction. Eight advisory panels to the steering committee were assembled to provide technical assistance in analyzing the nature of the education process in the eight professions. Panel members are listed at the end of the report. The Institute of Medicine/National Academy of Sciences is grateful for the assistance of the steering committee and the advisory panels.

The report is divided into three parts. Part I is a summary of the study group's findings and recommendations. Part II presents a legislative history of Federal aid for health professional education, aggregate data on the schools, education costs in the eight professions, methods for using costs in establishing capitation grant amounts, and detailed data on each of the professions.

Part III is a detailed description of the cost-finding methodology used in the study. It will be transmitted to Congress and the Department of Health, Education, and Welfare shortly after Parts I and II.

SUMMARY

Estimates of the costs of education in the health professions cannot be derived by routine methods of cost accounting. The activities that constitute education must be defined before costs can be assigned. The process depends on a thorough analysis of health professional schools. These institutions are central to an enterprise of great diversity and growing national economic impact:

- National health expenditures reached $94-billion in 1973 and now exceed $100-billion.
- Health occupations employ more than four million workers whose 600 different jobs range from clerical positions, which require no education past high school, to skilled professions for which training extends as many as 11 years past the college baccalaureate degree.

In the Comprehensive Health Manpower Training Act of 1971, Congress requested a study to estimate the costs of education per student in eight health professions: medicine, osteopathy, dentistry, optometry, pharmacy, podiatry, veterinary medicine, and nursing. A context for the study is provided by an appraisal of the educational institutions in the aggregate.

- More than 1,600 schools in the United States provide education in the eight professions (Figure *S-1*).
- The schools spent more than $3-billion in the education of more than 300,000 students in 1972 but received less than 40 percent of their income from unrestricted education funds (Figure *S-2*).
- Two-thirds of all health professional students are in nursing. The other seven professions in 1973 graduated 22,900 students with the first professional degree (Figure *S-3*).
- Health professional schools vary greatly in their curricula, mixture of students, organization, and financial structure. Institutional settings range from the freestanding school, which educates one type of professional, to a health science center complex of schools, which may educate students toward the first degree in five or six professions and also train graduate students and house staff. Schools with major programs of biomedical research and patient care may direct only a small protion of their activities toward education for the first degree.

FIGURE *S-1*

Number and Ownership of Health Professional Schools by Profession, 1972-73

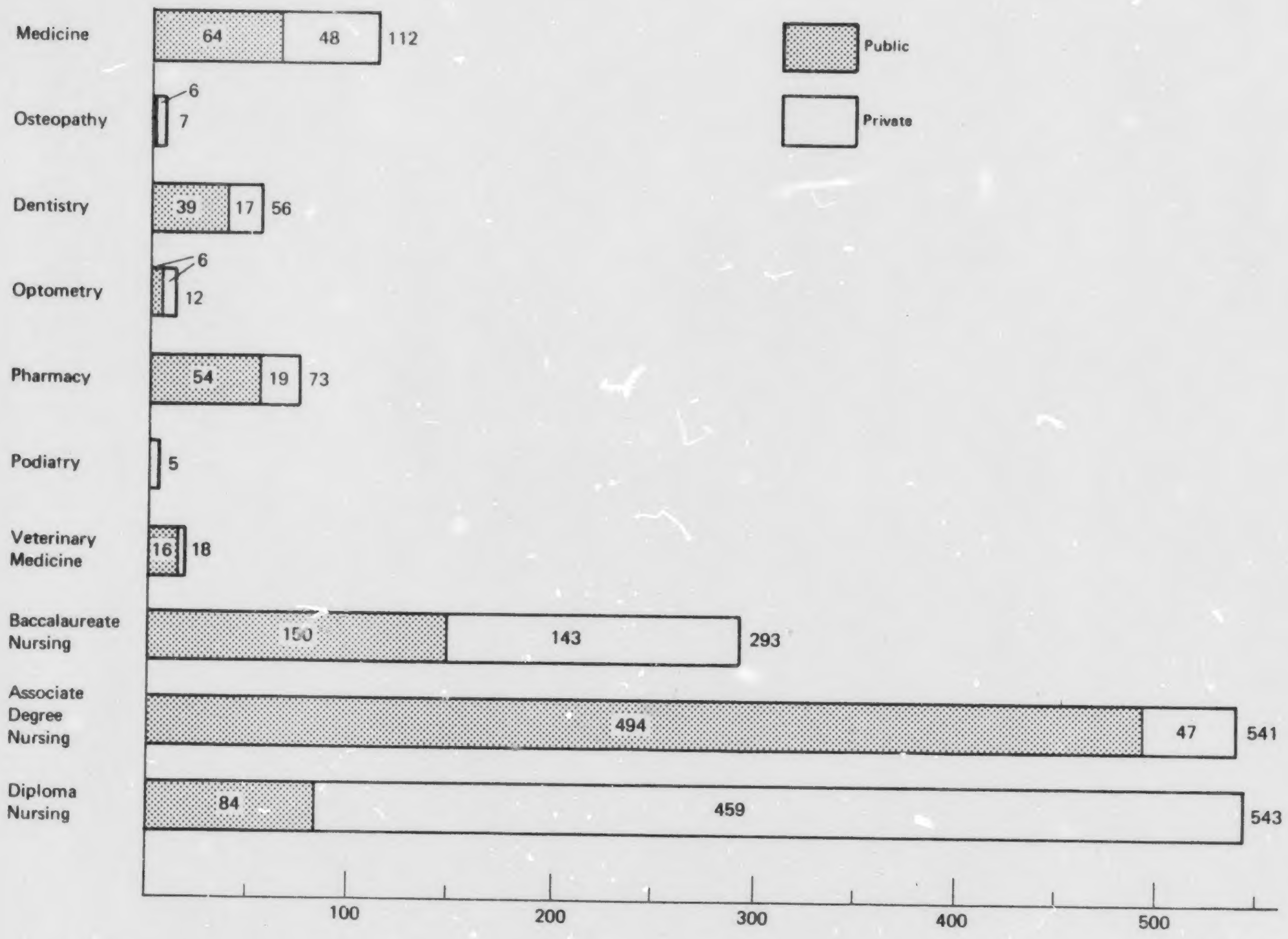
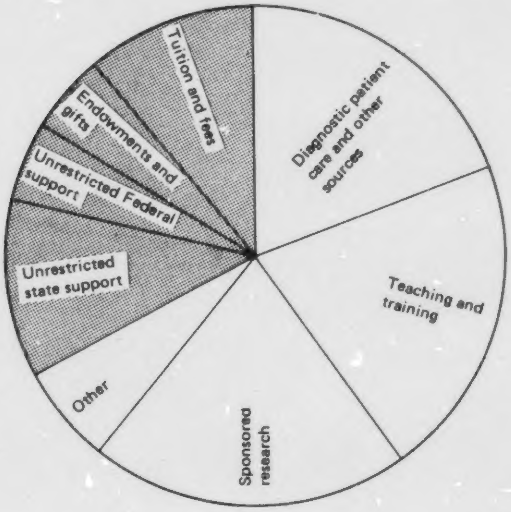


FIGURE S-2

Distribution of Reported Income and Expenditures of Eight Types of Health Professional Schools, by Category, 1971-72

Total Income = $3.1 billion[a]

Source of income	
Tuition and fees	9.9 %
Unrestricted state support	18.0
Unrestricted Federal support	6.7
Endowments and gifts	2.7
Research	19.9
Teaching and training	19.3
Diagnostic patient care and other sources	15.3
Other	8.2



[a] Shaded areas indicate unrestricted income

Total Expenditures = $3.1 billion

Distribution by profession	
Medicine	63.2 %
Osteopathy	1.7
Dentistry	6.4
Optometry	.6
Pharmacy	3.6
Podiatry	.2
Veterinary medicine	2.4
Nursing	21.9

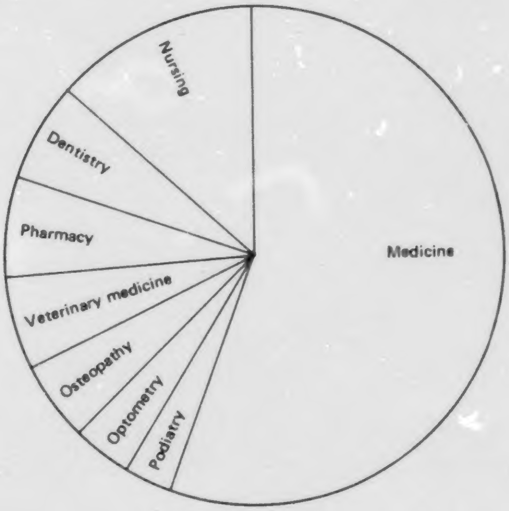
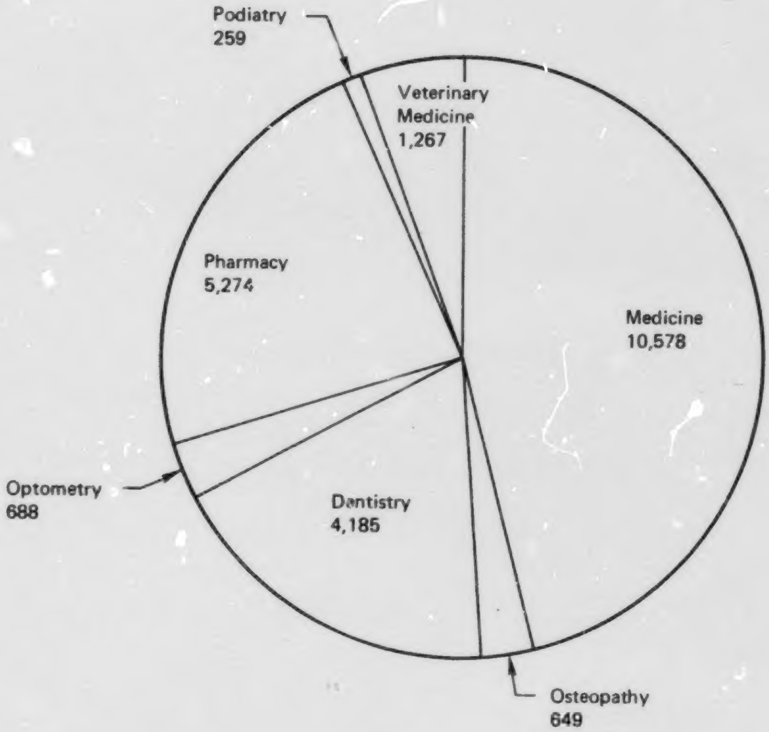


FIGURE S-3

First Degree Graduates from Seven Types of Health Professional Schools, 1973



Total: 22,900 Graduates

Education Costs

The process of education in the health professions includes not only instruction, but also those amounts of research and patient care considered essential to education. This definition takes into account that the process depends on an educational environment that supports the development of faculty as well as student skills. A study of the costs of that process requires many further definitions and appropriate methodologies.

- Instruction costs are defined the same for each of the professions except in the component of clinical teaching. In schools of dentistry, optometry, podiatry, veterinary medicine, and associate and baccalaureate nursing, clinical teaching is conducted in facilities established primarily for teaching purposes, and the clinic costs are included in instruction costs. In medicine, osteopathy, and diploma nursing the teaching clinics are part of major patient care programs, and the clinic costs are not included in instruction costs.

- Faculty activities are analyzed in this study as a method of describing education programs and defining their costs. At each of 82 sample schools, faculty recorded the time spent in various activities during one week. The distribution of time was used to allocate faculty costs to instruction, research, and patient care, occurring singly or as joint activities.

- A determination of the amounts of research and patient care that are essential to education requires subjective judgments that will be different from one profession to another. The study group obtained these judgments from educators and administrators convened in seminars for the professions of medicine, dentistry, and veterinary medicine--the professions whose education processes include the largest proportions of research and patient care. The judgments were employed in adding portions of research and patient care costs to instruction costs in order to determine the education costs in each profession.

Education costs derived by the study group (Table *S-1* and Figure *S-4*) are historical--what is, rather than what should be or what might be if more resources were available. Historical costs, as well as mixtures of activities, vary among the schools of different professions, in large part because the funds available for research and patient care have been greater in some professions than others.

Within each profession, the range of education costs per student is large (Table *S-2*). The variation is explained by differences in instruction costs and the amounts of research and patient care included in education.

TABLE *S-1*

Components of Average Annual Education Costs per Student by Profession, 1972-73

Profession	Total education costs	Components		
		Instruction	Research	Patient care
Medicine	$12,650	$7,650	$3,250	$1,750
Osteopathy	8,950 a/	6,550	400	2,050
Dentistry	9,050	8,000	1,050	0 b/
Optometry	4,250 a/	4,000	200	0 b/
Pharmacy	3,550	2,600	800	150
Podiatry	5,750	5,550	50	150
Veterinary Medicine	7,500	6,700	800	0 b/
Nursing				
Baccalaureate	2,500	2,500	--	--
Associate	1,650	1,650	--	--
Diploma	3,300	3,300	--	--

NOTE: Dollars are rounded to nearest $10.

a/Totals do not equal sum of components due to rounding.
b/Clinic costs included in instruction.

FIGURE *S-4*

Average Annual Education Costs per Student by Profession, 1972-73

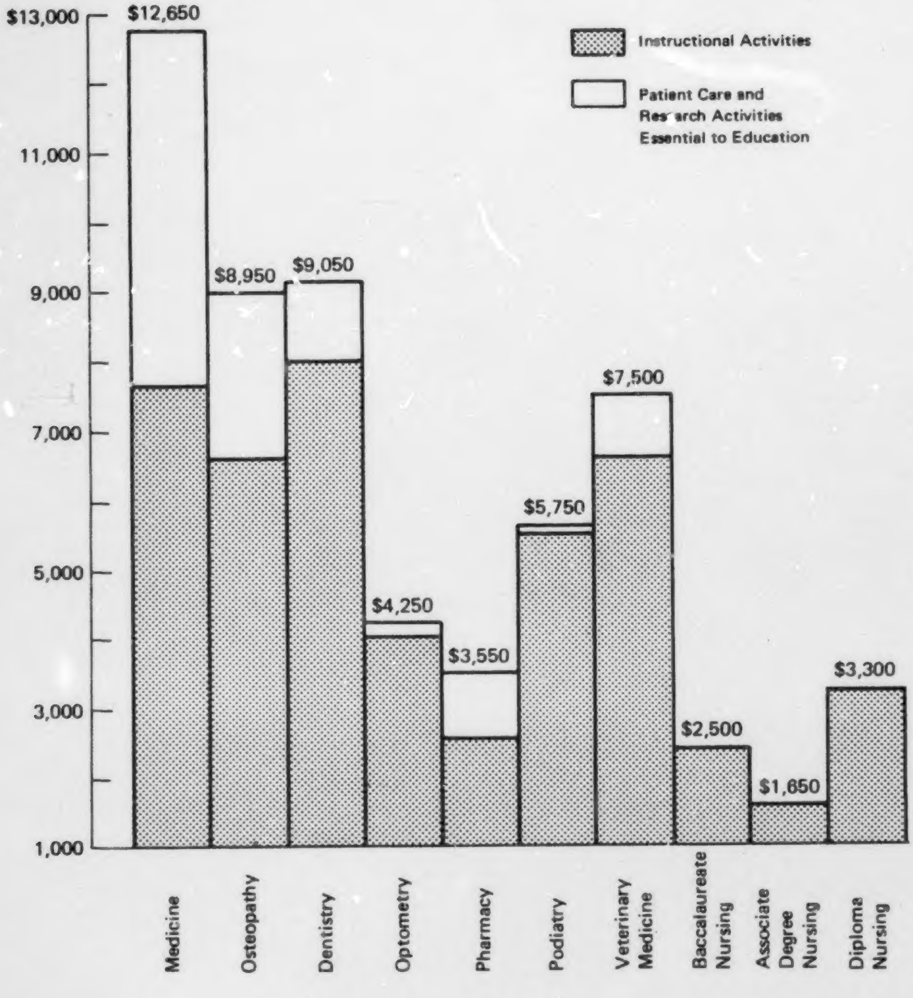


TABLE S-2

Average and Range of Annual Education Costs
per Student by Profession, 1972-73

Profession	Average	Range
Medicine	$12,650	$6,900 - 18,650
Osteopathy	8,950	6,900 - 12,350
Dentistry	9,050	6,150 - 16,000
Optometry	4,250	3,750 - 4,750
Pharmacy	3,550	1,600 - 5,750
Podiatry	5,750	4,400 - 6,700
Veterinary Medicine	7,500	6,050 - 10,500
Nursing		
Baccalaureate	2,500	1,200 - 4,050
Associate	1,650	1,050 - 2,150
Diploma	3,300	1,850 - 4,850

NOTE: Dollars are rounded to nearest $50.

Net Education Expenditures: A Basis for Capitation

Education costs are a measure of economic resources used in educating a student but they do not identify a school's need for financial support of the education program.

Net education expenditures describe the unfunded portion of education costs. The net is calculated by subtracting from education costs the income received from research and patient care activities (Table *S-3*). Net education expenditures identify that portion of the cost of education not offset by research and patient care income, which is the portion for which financing from education funds is required

Net education expenditures are equal to or less than education costs to the extent that the educational program generates income, which varies greatly among the professions (Figure *S-5*).

Within each profession, the variation of net education expenditures (Table *S-4*) reflects a differential ability of the schools to fund the research and patient care components of their education programs.

Financing Policy

A quarter-century of increase in Federal funds to health professional schools brought the total of Federal obligations in 1973 to nearly $1.3-billion, about one-third of the schools' expenditures. The government's interest in a stable base for health professional education has increased along with the Federal share of health expenditures. The schools are of value beyond the boundaries of the states in which they are located. The distribution of schools bears little relation to the distribution of the nation's population, and the mobility of health professionals reduces a state's motives to provide sole support for their training. Federal aid recognizes the status of the schools as a national resource and supplements state investments in health education.

- The study group *endorses* a policy that health professional schools be regarded as a national resource requiring Federal support.

Capitation provisions of the Comprehensive Health Manpower Act of 1971 were intended to provide a direct and stable source of financial support for health professional education. The Congress requested advice on how data on education costs could be used to set capitation rates.

- The study group *recommends* that the Federal government use net education expenditures as a basis for establishing rates of capitation payments to health professional schools.

Net education expenditures are the amounts that must be financed by tuition, fees, private endowment, and state and Federal appropriations.

TABLE *S-3*

Average Annual Education Costs, Offsetting Research and Patient Care Revenues and Net Education Expenditures, per Student by Profession, 1972-73

Profession	Education costs	Offsetting research revenues	Offsetting patient care revenues	Net education expenditures
Medicine	$13,100 a/	$2,100	$1,300	$9,700
Osteopathy	8,950	100	1,850	7,000
Dentistry	9,050	700	950	7,400
Optometry	4,250	50	1,050	3,100 b/
Pharmacy	3,550	450	50	3,050
Podiatry	5,750	0	800	4,900 b/
Veterinary Medicine	7,500	600	1,350	5,550
Nursing				
Baccalaureate	2,500	50	0	2,450
Associate	1,650	0	0	1,650
Diploma	3,300	0	1,800 c/	1,500

NOTE: Dollars are rounded to nearest $50.

a/The average education cost of $13,100 differs from the $12,650 displayed in Table *S-1* because one school is excluded from the $13,100 calculation for lack of income data.

b/Totals do not equal sum of components due to rounding.

c/Cost reimbursement by third party payers to parent hospitals.

FIGURE S-5

Average and Range of Annual Net Education Expenditures per Student by Profession, 1972-73

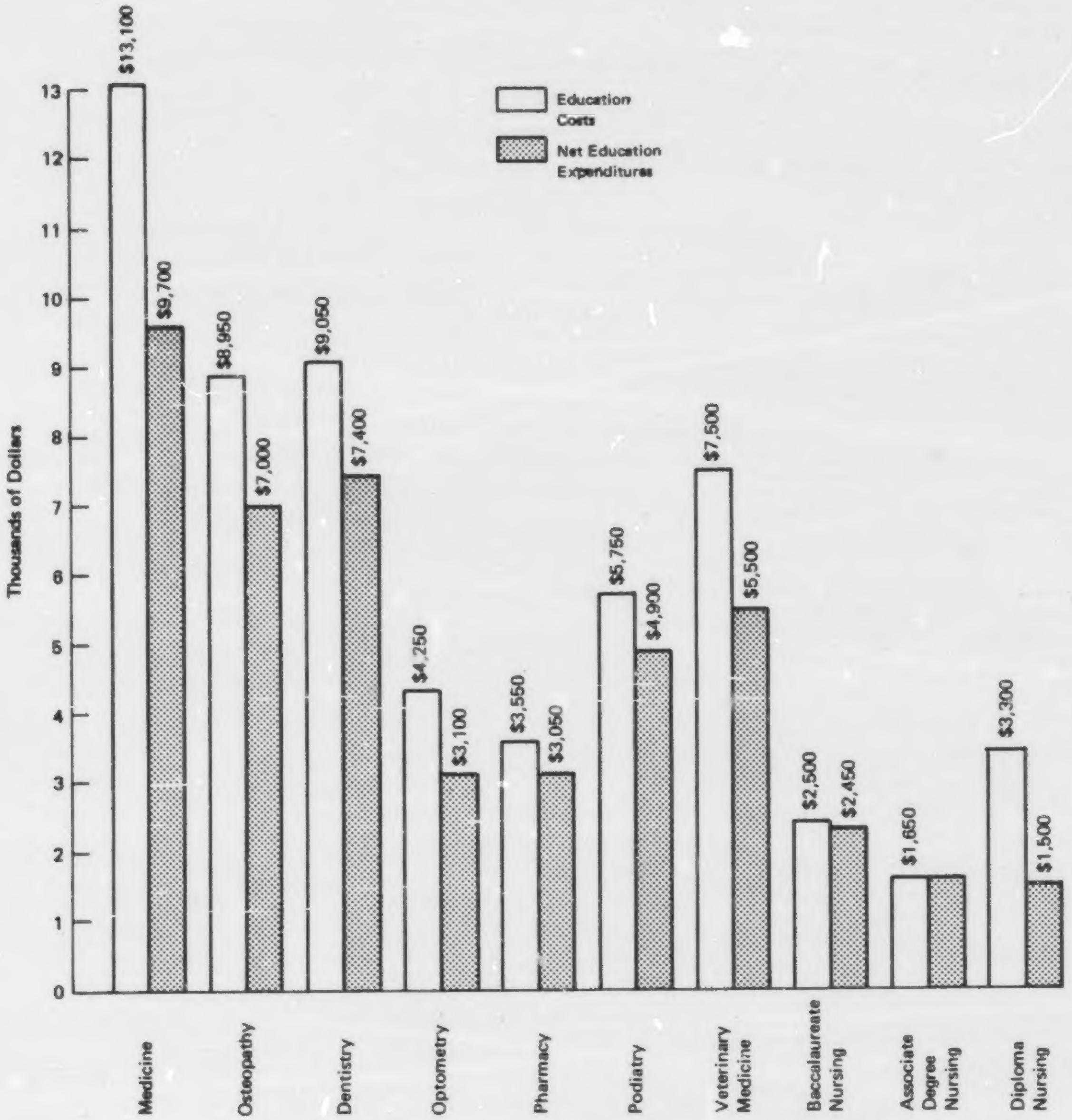


TABLE S-4

Average and Range of Annual Net Education Expenditures per Student by Profession, 1972-73

Profession	Average	Range
Medicine	$9,700	$5,150 - 14,150
Osteopathy	7,000	6,350 - 7,800
Dentistry	7,400	5,050 - 13,400
Optometry	3,100	2,550 - 3,400
Pharmacy	3,050	1,600 - 4,950
Podiatry	4,900	3,850 - 5,950
Veterinary Medicine	5,550	4,300 - 7,750
Nursing		
Baccalaureate	2,450	1,200 - 4,050
Associate	1,650	1,050 - 2,150
Diploma	1,500	400 - 2,550

NOTE: Dollars are rounded to nearest $50.

Capitation payments authorized under the 1971 Act ranged from 25 to 40 percent of the average net education expenditures, except for podiatry and nursing (Figure *S-6*).

Appropriations for capitation grants, however, were lower than the authorized amounts and fluctuate with each fiscal year. These circumstances weaken the intended stabilizing influence of capitation because the schools cannot make plans on the basis of anticipated income.

- The study group *endorses* a capitation grant program as an appropriate Federal undertaking to provide a stable source of financial support for health professional schools.

- The study group is of the *opinion* that capitation grants ranging between 25 and 40 percent of net education expenditures (Table *S-5*) would contribute to the financial stability of public and private health professional schools and would be an appropriate complement to income from tuition and gifts and support by state governments, all of which should be maintained as nearly as possible in their present proportions.

Enrollments in health schools have markedly increased in response to recent Federal funding policy based on projections of a health manpower shortage. Data for further such projections, however, are inconclusive. Capitation based on enrollments encourages increased class size; based on graduates it is an incentive to minimize dropouts.

- The study group *recommends* that capitation be based on graduates, with appropriate transitional support to schools that have greatly increased their enrollments in the past few years, or have recently changed to a three-year degree program.

- The study group *recommends* that capitation not encourage one length of curriculum over another in any one profession.

Capitation grants should assure the financial stability of health professional schools and require them to maintain their present production of graduates. Other goals of health manpower policy, the study group believes, can better be attained by other financing methods. Distribution of health professionals, for instance, depends heavily on financing of postgraduate education and payments for patient care but very little on capitation support of education to the first professional degree.

National debate about methods of governmental support for higher education, including that of health professionals, is concerned with a broad range of mechanisms. Institutional support can mean capitation grants, but it also can mean grants for financial distress or special projects. Student aid also has a variety of forms. The study group recognizes that these other mechanisms are being considered, but concludes that they are beyond the Congressional charge and the time allowed for this study.

FIGURE S-6

Authorized Capitation as a Percent of Average Net Education Expenditures, per Student by Profession, 1972-73

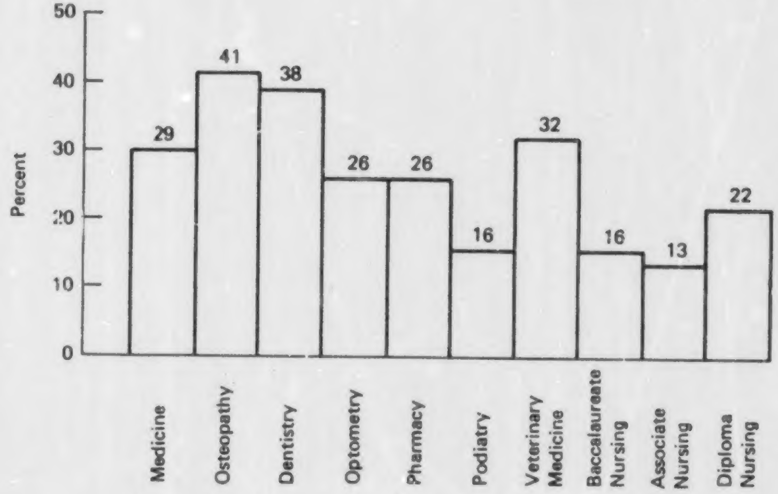


TABLE S-5

Capitation at Current Authorization Levels and at Different Levels of Average Net Education Expenditures, 1972-73

Profession	Net education expenditures per student	Currently authorized capitation amount	Average net education expenditures		
			25 percent	33-1/3 percent	40 percent
Medicine	$9,700	$2,850 a/	$2,450	$3,250	$3,900
Osteopathy	7,000	2,850 a/	1,750	2,300	2,800
Dentistry	7,400	2,850 a/	1,850	2,450	2,950
Optometry	3,100	800	800	1,050	1,250
Pharmacy	3,050	800	750	1,000	1,200
Podiatry	4,900	800	1,250	1,650	1,950
Veterinary Medicine	5,550	1,750	1,400	1,850	2,200
Nursing					
Baccalaureate	2,450	346 b/	600	800	1,000
Associate	1,650	213 b/	400	550	650
Diploma	1,500	250	400	500	600

NOTE: Dollars are rounded to nearest $50.

a/A basic capitation amount of $2,850 has been used rather than the $2,500, to reflect the $4,000 capitation award made for the students in the graduating class.

b/Per student equivalent.

Coordination of Government Health Policies

Financing policies for programs in health professional education are made unduly complex at the Federal level by the multiplicity of Congressional committees and executive agencies that deal with the programs. Research and education support are not coordinated with policies of payment for patient care. Changes in policy for one program, if not made in cognizance of the effect on other programs, can greatly alter the priorities of the beneficiary institutions and threaten the stability promised by capitation grants.

- The study group *recommends* that a mechanism be established in the Federal executive and legislative branches to coordinate the implementation of any financing policy for health professional education.

Improving Reporting of Costs

The data presently available on costs for all health professional education are inadequate. Improvements can be made in cost reporting and analysis by, among other measures, (1) coordinating and simplifying the reports required by government agencies and professional groups, (2) standardizing requirements for schools in reporting student and faculty financial data, and (3) conducting an annual analysis of activities in a sample of schools in order to estimate current education costs per student and net education expenditures. The study group is preparing a manual to assist schools in establishing a uniform cost reporting system based on the methodology described in detail in Part III of this report.

Recommendations Summarized

- The study group *endorses* a policy that health professional schools be regarded as a national resource requiring Federal support.

- The study group *recommends* that the Federal government use net education expenditures as a basis for establishing rates of capitation payments to health professional schools.

- The study group *endorses* a capitation grant program as an appropriate Federal undertaking to provide a stable source of financial support for health professional schools.

- The study group is of the *opinion* that capitation grants ranging between 25 and 40 percent of net educational expenditures would contribute to the financial stability of public and private health professional schools and would be an appropriate complement to income from tuition and gifts and support by state governments, all of which should be maintained as nearly as possible in their present proportions.

- The study group *recommends* that capitation be based on graduates, with appropriate transitional support to schools that have greatly increased their enrollments in the past few years, or have recently changed to a three-year degree program.

- The study group *recommends* that capitation not encourage one length of curriculum over another in any one profession.

- The study group *recommends* that a mechanism be established in the Federal executive and legislative branches to coordinate the implementation of any financing policy for health professional education.

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Chapter 1

THE GROWTH OF FEDERAL AID FOR HEALTH PROFESSIONAL EDUCATION

The Comprehensive Health Manpower Act of 1971 is the most recent of a long series of legislative enactments that have affected Federal funding for health professional education. Some of the earlier legislation, designed to serve a variety of purposes concerning the nation's health care and research, affected the funding of health education only as a byproduct of the main effort. As this brief history will show, the principal intents of the various laws that have put Federal money into health education also have influenced profoundly the goals and products of the schools.

At the beginning of this century, the Federal laws dealing with health represented a view of governmental responsibility that was limited to such public health concerns as communicable diseases and the care of the government's own military personnel and other special beneficiaries. The scattered programs of medical research and health services were first consolidated in 1912 by legislation establishing the U.S. Public Health Service (PHS). Sporadic enactments during the next two decades somewhat expanded Federal responsibilities for sponsoring biomedical research, but not until 1930 was there any legislative success in organizing the Federal programs. In that year, the Ransdell Act established a National Institute of Health (NIH) but did not greatly increase the government's commitment to research.

The impetus for large Federal investments in the biomedical sciences came in 1944 with amendments to the Public Health Service Act. These amendments gave NIH authority to conduct an extensive research program, largely by supporting biomedical investigations in the nation's graduate schools and particularly in the medical schools. These research grants constituted the main Federal investment in health professional schools for two decades, and, as the flow of Federal research funds increased, the schools expanded their faculty and programs in the direction dictated by the avowed purpose of the money.

For medical schools, which received the major share of biomedical research grants, the proportion of income related to Federal research rose from 11 percent in 1947 to 42 percent in 1968. And by 1968 approximately 33 percent of the total faculty salary budget for the nation's medical schools was supported by the government's research and research training grants; about 40 percent of the full-time medical faculty was receiving some Federal research money.

The momentum of health professional school expansion in pursuit of research continued well beyond the time that Federal legislation began to indicate interest in supporting health professional education directly. The first major development in that direction was the 1963 Health Professional Educational Assistance Act (Public Law 88-129) and related legislation, which offered matching grants for health school construction and loans for students in several of the professions.

Shortly thereafter, Federal lawmakers enlarged the nation's commitment to health professional education, spurred by increasingly frequent predictions of a health manpower shortage. The 1965 Health Professions Educational Assistance Amendments and related legislation offered grants to five categories of schools that would promise to increase enrollments, and also guaranteed loans for low-income students who otherwise might have to drop out of health schools.

Federal bonuses to health schools that increased their enrollments emerged in the 1968 Health Manpower Act (P.L. 90-490). This Act altered the grant practice of the previous few years by stipulating a flat, and nominal, sum for each school, with additional funds dependent on increases in student body or number of graduates. The 1968 law also explicitly recognized a problem that only recently had begun to be of concern to the health schools; it authorized grants to "assist any such schools which are in serious financial straits to meet their cost of operation."

A major reason for claims of "serious financial straits" among health educational institutions was a leveling off in Federal funds for research. Schools had grown in response to research money; when that money dwindled because Federal interest shifted to other health areas, many schools were unable to change direction quickly enough to avoid deficits. In 1970, the Health Training Improvement Act extended the authorization for grants to alleviate financial distress and also intensified Federal encouragement of new health professional schools.

At about the mid-point in the shift of Federal health emphasis from research to education, the 1965 Medicare and Medicaid amendments to the Social Security Act were enacted. These programs provided Federal money to pay for the health care of aged and indigent patients, many of whose medical expenses had previously been absorbed by the patient care programs of the health professional schools, and to some extent by county, muncipal, and state governments. The schools were able to reduce their direct subsidy for care of what had been called charity patients. Interns and residents also reduced their indirect subsidy of that care by seeking increased salaries.

The legislative emphasis on health manpower continues in the most recent enactments, the Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157) and its companion Nurse Training Act (P.L. 92-158). They authorize annual operating grants to health professional schools, based on the number of students enrolled in a school--a "capitation" formula. The initial amounts of capitation payments to schools in eight professions covered by the Act are shown in Table 1, which also compares the amounts authorized with the amounts appropriated. The 1974 appropriations for schools of medicine, osteopathy, and dentistry were about 65 percent of the amounts authorized; schools of optometry, pharmacy, podiatry, and

TABLE 1

Capitation Grants per Student and Total Amounts Authorized and Appropriated, by Profession, 1972-74

Profession	Grants per student		Total amounts authorized and appropriated (in millions of dollars)					
			Fiscal 1972		Fiscal 1973a/		Fiscal 1974a/	
	Basic	Supplemental for new enrollment	Auth.	Approp.	Auth.	Approp.	Auth.	Approp.
Total			$312.0	$186.7	$332.0	$200.6	$367.0	$223.5
MOD Group			200.0	130.0	213.0	138.5	238.0	152.5
Medicine	$2,500	$1,000						
Osteopathy	2,500	1,000						
Dentistry	2,500	1,000						
VOPP Group			34.0	25.2	37.0	23.6	41.0	34.8
Optometry	800	320						
Pharmacy	800	320						
Podiatry	800	320						
Veterinary Medicine	1,750	700						
Nursing	250	100	78.0	31.5	82.0	38.5	88.0	36.2

SOURCE: U.S. Department of Health, Education and Welfare, Public Health Service, *Health Professions Capitation Grants, FY 1972*, Publication No. [NIH] 73-460, and official accounting records of the National Institutes of Health.

a/These numbers reflect the 1974 Appropriation bill for HEW. The Administration may not fully obligate these funds.

veterinary medicine received about 85 percent of their authorized amounts; nursing schools received 41 percent.

The 1971 acts, which complete the outline of legislative history presented in Table 2, also contain provisions for grants to ease financial distress of health schools, but capitation grants appear largely to have replaced distress grants as a source of funds.

Federal Decisions and Health Education

The preceding brief legislative history indicates the considerable effect of Federal policies in altering the nature and missions of health professional schools. The activities of health professional schools have swung in response to Federal funding, varying in directions toward research, education, and patient care.

The course of Federal influence on health education contrasts with the way in which Federal funding is handled for higher education generally. Most of the Federal money for health professional education goes to the institutions; most of the Federal money for other higher education goes to the students. The Federal investment in other higher education has been aimed primarily at reducing financial barriers for students, and secondarily at producing specific types of trained manpower.

In health professional education, the Federal shifts of emphasis among research, education, and patient care have usually been made without sufficient consideration of the fact that all three programs contribute to the educational environment of most health students. The support of that environment requires a balance among its programs and a stability of financing that have not been manifest in Federal policy thus far.

Numerous separate Congressional committees and executive agencies oversee health policy matters. Coordination of their efforts is difficult and infrequent. Policies that aid research and education have little relation to each other or to those that pay for patient care. Fragmented authority for Federal decisions encourages special interests to make claims for increased support in one enterprise or another. Different government agencies separately purchase research, education, and patient care in isolated efforts that can cause duplication in one part of the system, neglect in another part, and confusion throughout.

- The study group *recommends* that whatever financing method eventually emerges for health professional education, it should be accompanied by a mechanism for review and coordination in the legislative and executive branches of the Federal government.

Agencies that support the products of the educational process must be able to know the combined effects of their support in order to achieve a rational financing program.

TABLE 2

Major Federal Legislation Affecting Health Professional Education, 1930-1971

Year	Title	Summary of Major Provisions
1930	Ransdell Act	Consolidated Federal biomedical research activities under National Institute of Health.
1944	Public Health Service Act	Public Health activities consolidated into one Act. NIH received legislative authority to conduct a broad program of biomedical research. Represented conscious policy choice to use universities as a base for the advancement of biomedical knowledge.
1963	Health Professions Educational Assistance Act (P.L. 88-129)	Authorized matching grants for construction and renovation of teaching facilities in eight categories of health professional schools. Authorized loans for students in medical, dental, and osteopathic schools.
1964	Nurse Training Act (P.L. 88-581)	Authorized (1) construction and renovation grants for teaching facilities in nursing schools, (2) limited capitation grants for diploma schools, (3) special project grants for upgrading nursing education, (4) special traineeship programs, and (5) student loan programs.
1965	Health Professions Educational Assistance Amendments of 1965 (P.L. 88-290)	Authorized basic and special improvement grants to five types of health professional schools for increased enrollment. Provided for loans to low income students to continue their education in health professional schools.
1965	Medicare and Medicaid (Titles XVIII and XIX of the Social Security Act)	Through Federal support of medical care costs for the aged and indigent, provided financial relief to health professional institutions through third-party payments,which unified the rate structure and permitted salaries of house staff to increase.
1966	Veterinary Medical Education Act (P.L. 88-709)	Extended provisions of Health Professions Educational Assistance Act of 1963 to schools of veterinary medicine.
1968	Health Manpower Act of 1968 (P.L. 90-490)	Extended provisions of Health Professions Educational Assistance Act of 1963 and the Nurse Training Act of 1964, but with a $15,000 flat grant for nursing schools and a $25,000 grant for the other categories of schools. Bonuses to be distributed on the basis of increased enrollment. Special project grant authority expanded to include awards for financial distress.
1970	Health Training Improvement Act of 1970 (P.L. 91-519)	Authorized special funds for medical and dental schools in financial distress and requested HEW to conduct a study on how best to alleviate financial distress. Modified the institutional grant provisions to be responsive to new schools.
1971	Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157)	Authorized capitation grants for health professional schools; initiative awards to alleviate manpower shortages in underserved areas; special project grants to expand or improve training; increased loans and scholarships; traineeship and fellowship grants in family medicine. Reduced authorization amounts for financial distress grants.
1971	Nurse Training Act of 1971 (P.L. 92-158)	Extended most of provisions of P.L. 92-157 to schools of nursing.

Chapter 1

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Chapter 2

HEALTH PROFESSIONAL SCHOOLS TODAY

Three decades of increasing Federal aid to health professional education have spread new schools across the country and enlarged the faculties and enrollments of existing schools. The following aggregate data on the schools of eight health professions provide a context of their present situation in order to facilitate an understanding of more detailed analysis in the remainder of this report.

These aggregate data are assembled from reports made by the schools, either in response to queries of professional associations or in answer to requests by the Institute of Medicine/National Academy of Sciences study group. The amount of detail varies from profession to profession. There are no consistent sources of annual financial data for all health professional schools. The U.S. Department of Health, Education, and Welfare (HEW) publishes some nonfinancial data, and the U.S. Office of Education collects annual financial data on entire universities but not on the health professional schools within universities.

The lack of consistent data on the schools--and the reasons for that lack--pose difficulties in determining the costs of the education provided by the schools. Methods used by the study group to develop the estimates are efforts to overcome the problems of inadequate data.

Location and Type of Control

The geographic distribution by major census regions of the 1,660 health professional schools in the United States is shown in Table 3, which also indicates how many are publicly and privately owned. Figure 1 shows more clearly that residents of some large geographic areas are at a considerable distance from any health professional school. Locations of health science centers and freestanding schools no longer are, if they ever were, in accord with the distribution of the population. Neither have the locations been dictated by national policy.

Public and private control of the schools, as evidenced by Table 3, varies widely from one profession to another. In total numbers of schools, public control predominates for medicine, dentistry, pharmacy, veterinary medicine, and nursing. Optometry schools are evenly split between public and private control. Schools of osteopathy and podiatry are largely private. Enrollments are a different matter, because private schools generally are larger than public except in veterinary medicine and pharmacy. In 1972, only

TABLE 3

Location and Ownership of Eight Types of Health Professional Schools, 1972-73

Profession	Number of Schools a/	Major census regions				Ownership	
		Northeast	North Central	South	West	Public	Private
Medicine	112 b/	30	29	37	16	64	48
Osteopathy	7	1	5	1	0	1	6
Dentistry	56	12	16	21	7	39	17
Optometry	12	3	3	3	3	6	6
Pharmacy	73	14	21	26	12	54	19
Podiatry	5	2	2	0	1	0	5
Veterinary Medicine	18 c/	2	8	5	3	16	2
Nursing:	1,377	404	391	396	186	728	649
Baccalaureate	293	75	82	93	43	150	143
Associate	541	94	131	197	119	494	47
Diploma	543	235	178	106	24	84	459

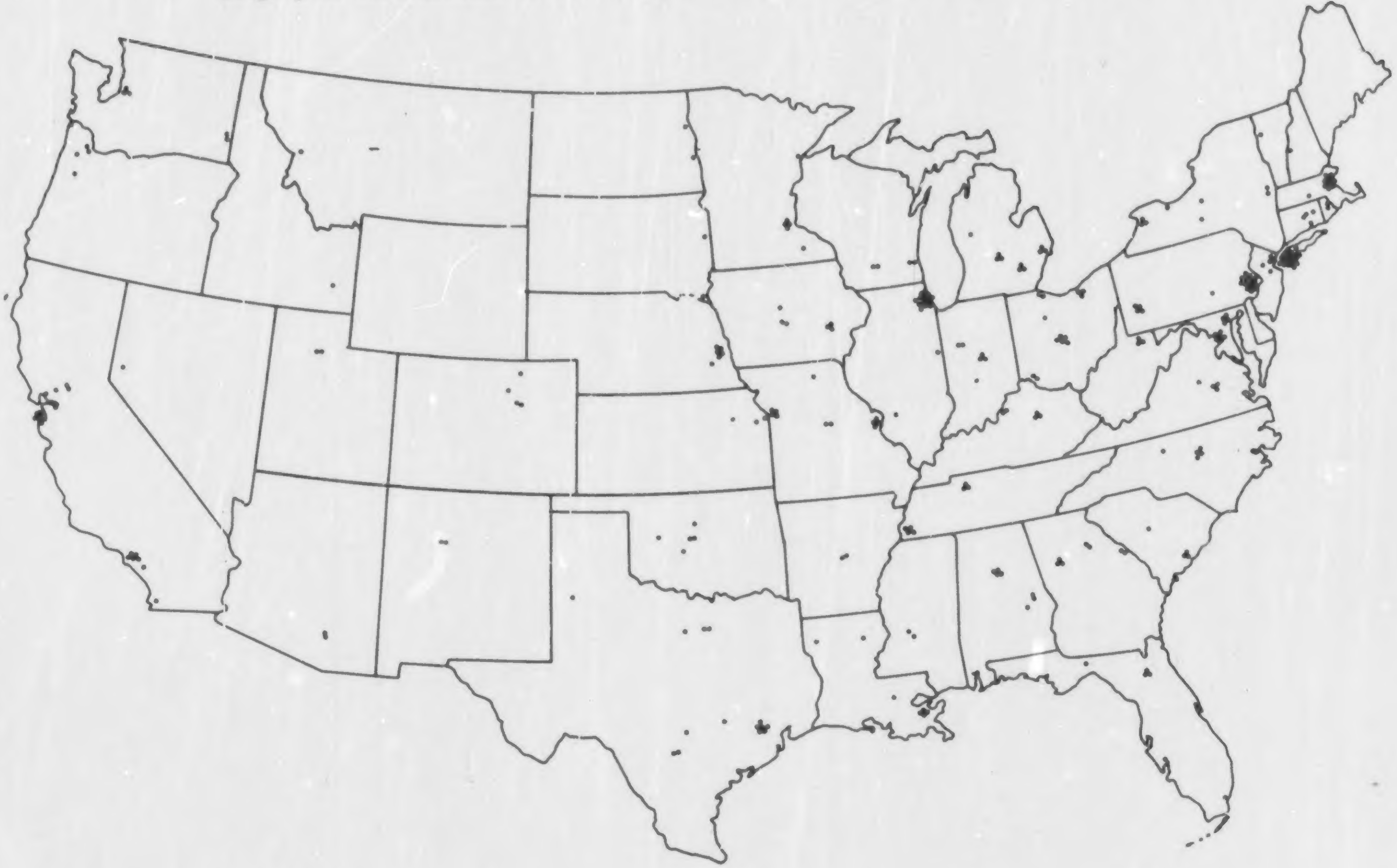
a/Except for nursing, all schools in the United States, Guam, and Puerto Rico that have admitted students as of January, 1973, are included. Nursing schools include programs reporting to the National League for Nursing as of October 15, 1972.

b/Includes six schools that have two-year basic science programs, and eight schools with developing programs.

c/The Louisiana State University School of Veterinary Medicine plans to admit its first class in January, 1974, which will raise the total to 19 schools.

FIGURE 1

Geographic Distribution of Seven Types of Health Professional Schools, 1972-73



about 55 percent of all medical students were in public schools, the rest in private schools. Dental students were divided about equally between public and private. Enrollments in osteopathy, optometry, and podiatry schools were heavily on the side of private institutions.

The Federal government has a considerable interest in supporting the training of health manpower because the geographic distribution and ownership of health professional schools and the mobility of graduates are often unrelated to local need.

Institutional Settings

The institutional setting of a health professional school is a major factor in determining its variety of educational and other programs. Most schools either are freestanding, or are a major division of a university, or are part of a larger health science center of a university. Nursing programs have settings in health science centers, four-year colleges, two-year colleges, and hospitals.

Administrative structures differ according to the institutional settings, particularly in the strata of administration above a health school and in the flow of resources and finances between schools. Simplified examples of three structures are illustrated in Figure 4.

About half of the medical schools and most dental schools are part of health science centers; about half of the schools of optometry and most schools of pharmacy and veterinary medicine are university based; most schools of osteopathy and all podiatry schools are freestanding, as shown in Table 4. For nursing programs the distribution is 40 percent in freestanding institutions, including hospitals; 57 percent in four-year colleges, junior colleges and universities; and only 3 percent in health science centers.

The least complex administrative form is the freestanding school. But even these often sponsor graduate and house staff programs and some freestanding medical schools also have nursing programs. The most complex situation is in a health science center, where a medical school faculty member may instruct medical, dental, nursing, and other students. One of the difficulties in estimating education costs in a particular profession is that financial transfers from one program to another may not reflect the economic value of a faculty member's service to several professions. Michigan State University, for example, shares faculty services in medicine, osteopathy, veterinary medicine, and nursing. The accuracy with which such cross-subsidization can be measured depends largely on the accounting practices of the schools. Part III of this report discusses problems in adjusting costs for cross-subsidies and presents the approaches used in this study.

The variety of institutional settings complicates the measurement of costs and also affects the costs. For example, a school's choice between teaching different types of health professional students in the same facility or maintaining separate facilities must take into consideration the quality and costs of each approach.

FIGURE 2

Examples of Institutional Settings for Health Professional Schools

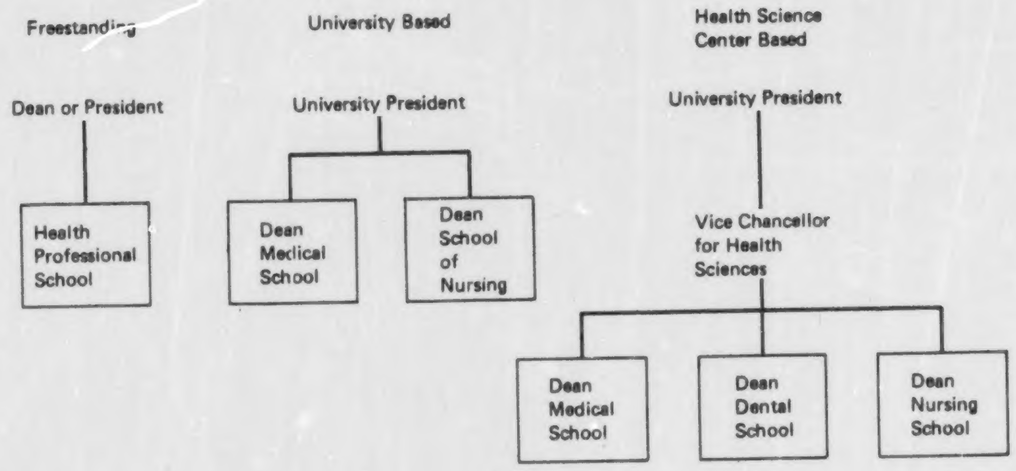

Freestanding
Dean or President
Health Professional School
University Based
University President
Dean Medical School
Dean School of Nursing
Health Science Center Based
University President
Vice Chancellor for Health Sciences
Dean Medical School
Dean Dental School
Dean Nursing School

TABLE 4

Institutional Settings for Health Professional Schools by Professions

Profession	Number of schools	Health science center	University based	Free-standing
		Percent distribution		
Total	1,660			
Medicine	112	51	41	8
Osteopathy	7	0	14	86
Dentistry	56	89	11	0
Optometry	12	16	42	42
Pharmacy	73	53	43	4
Podiatry	5	0	0	100
Veterinary Medicine	18	26	74	0
Nursing	1,377	3	57	40

NOTE: The number of each of the eight types of health professions found in the various settings are given in Chapters 5-12.

TABLE 5

Graduates from Seven Types of Health Professional Schools, 1973

Profession	First degree graduates	Percent distribution
Total	22,900	100
Medicine	10,578	46
Osteopathy	649	3
Dentistry	4,185	18
Optometry	688	3
Pharmacy	5,274	23
Podiatry	259	1
Veterinary Medicine	1,267	6

Additional administrative strata that facilitate cross-subsidization in a health science center also affect university administrative costs, whether or not the health professional schools are charged directly for those costs and whether or not the costs are offset by reduced faculty or increased quality of education.

Degree Programs and Students

Health professional schools award a variety of degrees: doctoral, baccalaureate in nursing and some pharmacy schools, associate degrees in some nursing schools, and a diploma of graduation in about 550 hospital-based and freestanding nursing schools.

The 51,784 graduates of nursing schools represent about 70 percent of all health professionals graduated in the eight fields during the 1971-72 school year.* The distribution among professions of 1973 graduates of health schools (excluding nursing, for which data are not available) is shown in Table 5.

Enrollment and faculty size for all schools of each health profession are shown in Table 6. Proportions of first degree students and candidates for advanced degrees differ among professions. In medical schools, house staff (interns and residents) and graduate students (Ph.D. candidates and post-doctoral fellows) are more numerous than M.D. students. The proportion of advanced degrec students is smaller in the other professions.

Aggregate Income and Expenditures

Expenditure and income data for the academic year 1971-72, presented in Tables 7 and 8, illustrate the multiple activities of health professional schools. These aggregate data also suggest the extent to which schools in different professions depend upon different funding sources.

Expenditures are divided largely between regular operations budgets and sponsored programs, the latter defined as programs being funded from income restricted to specific purposes.** Patient care expenditures and revenues are not true totals because some of these financial flows, particularly patient care revenues, often are part of affiliated hospitals' budgets or separate practice plans.

Sponsored research varies among the eight professions, ranging from nearly one-third of reported expenditures in medicine and veterinary medicine to almost none in podiatry.

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*It should be noted that while nursing schools graduate most of the health professionals each year, they also experience higher attrition rates than any of the other professions.

**The regular operations budget may partly support sponsored research projects by paying part of the salaries of faculty members who are also research investigators. Such expenditures probably are small for all but the medical schools, but total research costs for medical schools may be underestimated because some faculty costs are not included.

TABLE 6

Health Professional Schools by Size, Type of Student and Faculty Size, 1972-73

Profession	Number of schools.	Number of students for the first professional degree	Number of other students			Faculty	
			Total	Interns and residents	Graduate students and post-doctoral students	Full-time	Part-time
Total	1,660	315,064	64,186	34,026	30,160	58,178	16,274
Medicine	112	47,107	50,673	32,556	18,117	33,550	6,870
Osteopathy	7	2,565	91	91	0	392	132
Dentistry	56	18,456	3,516	1,255	2,261	3,711	5,686
Optometry	12	3,313	46	0	46	644	c/
Pharmacy	73	23,656	2,215	0 a/	2,215 b/	1,507	636
Podiatry	5	1,403	42	34	8	109	71
Veterinary Medicine	18 d/	5,437	1,261	90	1,171	1,471 e/	e/
Nursing:	1,377	213,127 f/	6,342		6,342	16,794	2,879
Baccalaureate	293	73,890	6,342		6,342	5,534	877
Associate	541	67,543	0		0	3,588	660
Diploma	543	71,694	0		0	7,672	1,342

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a/Not included in the total were 203 residents in programs accredited by the American Society of Hospital Pharmacists. Although figures were not available, there were additional residents in other programs and interns serving in community pharmacies.

b/Includes Pharm.D. students who hold B.S. degrees in pharmacy.

c/Part-time faculty was not available for schools of optometry.

d/Fully operational. One additional veterinary medical school expects to admit its first class in January, 1974.

e/Full-time equivalent. Part-time faculty was not available for schools of veterinary medicine.

f/Enrollment as of July 31, 1972.

TABLE 7

Reported Expenditures for Eight Types of Health Professional Schools, by Type of Expenditure, 1971-72

Type of expenditures	Total	Medicine a/	Osteopathy	Dentistry b/	Optometry c/	Pharmacy c/	Podiatry	Veterinary Medicine c/	Nursing
(in millions of dollars)									
Total	$3,072.7	$1,942.8	$51.1	$195.4	$17.0	$112.1	$7.2	$73.1	$674.0
Regular operations programs		742.4	15.9	132.9	12.9	98.8	5.1	37.4	625.0
Sponsored programs		1,058.4	4.3	41.9	.9	11.2	d/	26.3	49.0
Research		550.9	.3	17.2	.5	8.3	---	24.0	7.0
Teaching and training		254.2	2.8	10.3	.4	2.6	---	1.8	40.0
Other		253.3	1.2	14.4	---	.3	d/	.5	2.0
Patient care and services		142.0	30.9	20.6	3.2	.3	2.1	7.8	---
Other or non-distributed		---	---	---	---	1.8	---	1.6	---
(percent distribution)									
Total	100	100	100	100	100	100	100	100	100
Regular operations programs		38.2	31.1	68.0	75.9	88.1	70.8	51.2	92.7
Sponsored programs		54.5	3.4	21.5	5.3	10.0	---	35.9	7.3
Research		28.4	.6	8.8	2.9	7.4	---	32.8	1.1
Teaching and training		13.1	5.5	5.3	2.4	2.3	---	2.5	5.9
Other		13.0	2.3	7.4	---	.3	---	.6	.3
Patient care and services		7.3	60.5	10.5	18.8	.3	29.2	10.7	---
Other or non-distributed		---	---	---	---	1.6	---	2.2	---

SOURCE: Association of American Medical Colleges, *Annual Financial Report, 1971-72*. American Association of Dental Schools, Council on Dental Education, *Annual Report on Dental Education Finances, 1971-72*. Sources for medicine and dentistry, respectively. Nursing figures were projected from the cost study sample of nursing schools. Expenditures for the other five professions were based on schools' responses to questionnaires designed by the study staff.

a/Data supplied by AAMC covered income only; the study group estimated expenditures from income.
b/Expenditure data provided by the Council on Dental Education were not consistent with the format used in this table; therefore, expenditures were estimated from income.
c/Although separate income and expenditure data were provided in pharmacy, optometry, and veterinary medicine, the difference between the aggregate income and expenditure totals for each profession was extremely large, reflecting certain unrestricted income categories not captured in the questionnaires, such as general university support. In response to this, study staff estimates of total income were prepared on the assumption that income items represent income equal to expenditures, not necessarily the full amount of income received in a given fiscal year.
d/$4,000 in other sponsored programs.

TABLE 8

Reported Income For Eight Types of Health Professional Schools, by Type of Income, 1971-72

Type of income	Total	Medicine	Osteopathy	Dentistry	Optometry a/	Pharmacy a/	Podiatry	Veterinary Medicine a/	Nursing
	(in millions of dollars)								
Total	$3,070.3	$1,942.8	$49.3	$195.4	$17.0	$112.1	$6.6	$73.1	$674.0
General non-restricted									
Subtotal		573.1	13.9	121.5	8.0	48.4	4.2	30.6	345.0
Tuition and fees		78.5	4.9	36.3	4.8	11.3	2.4	b/	165.0
Government grants		423.8	7.9	81.2	2.8	35.2	1.8	29.5	175.0
State		311.8	5.5	69.3	1.0	25.4	.3	27.1	110.0
Federal		112.0	2.4	11.9	1.8	9.8	1.5	2.4	65.0
Endowment, gift, etc.		70.8	1.1	4.0	.4	1.9	a/	1.1	5.0
Restricted (sponsored) program income									
Subtotal		1,058.4	2.5	47.9	.5	12.9	.1	27.7	49.0
For research		550.9	.3	17.2	.1	7.7	a/	25.3	7.0
State		15.2	---	.3	---	---	a/	7.4	---
Federal		440.4	.2	14.5	---	6.1	a/	15.1	7.0
Other		95.3	.1	2.4	---	1.6	a/	2.8	---
Teaching and training		254.1	.9	21.3	.4	2.4	a/	2.4	40.0
Other		253.4	1.3	9.4	---	2.8	.1	---	2.0
Income from diagnostic patient care and other sources		142.1	30.8	20.6	3.1	1.6	1.7	9.9	260.0
Other income		169.2	2.1	5.4	5.4	49.2	.6	4.9	20.0

SOURCE: Association of American Medical Colleges, *Annual Financial Report, 1971-72*. American Association of Dental Schools, Council on Dental Education, *Annual Report on Dental Education Finances, 1971-72*. Sources for medicine and dentistry, respectively. Nursing figures were projected from the cost study sample of nursing schools. Expenditures for the other five professions were based on schools' responses to questionnaires designed by the study staff.

a/Although separate income and expenditure data were provided in optometry, pharmacy, and veterinary medicine, the difference between the aggregate income and expenditure totals for each profession was extremely large, reflecting certain unrestricted income categories not captured in the questionnaires, such as general university support. In response to this, study staff estimates of total income were prepared on the assumption that income items represent income equal to expenditures, not necessarily the full amount of income in a given fiscal year.

b/Income from tuition and fees for schools of veterinary medicine are not currently available.

The aggregate income for sponsored programs, excluding patient care, approximates expenditures for sponsored programs. Schools of medicine, optometry, and veterinary medicine receive a higher percentage of their income for sponsored programs than do schools of other professions.

Reported income from patient care services also varies among the eight professions. Schools of osteopathy, podiatry, and diploma nursing derive relatively large proportions of their total incomes from patient care, but it is a small proportion of known medical school income and is negligible for pharmacy schools. In all schools, except veterinary medicine and baccalaureate and associate degree nursing, part of patient care income comes from third-party payers--private insurance companies, Medicare, and Medicaid.

Tuition and student fees are a smaller proportion of income for medical schools than for schools in any other health profession.

Annual tuition, as shown in Table 9, ranges from $200 to $3,100 in the eight types of health professional schools, depending primarily on whether or not a school is public and whether or not a student qualifies as a resident of the state in which the school is located. In medicine, for example, private schools charged tuition of $1,978 to $3,075 in 1972, while public schools charged to state residents $1,300 at the most and $200 at the least. Except for nursing schools and the one public school of osteopathy, the average tuition and the ranges vary little among the health professions.

All professional schools derive additional income from student fees for books, activities, supplies, use of laboratories, and technical equipment. Equipment fees are highest in dental schools, ranging from $500 to $5,000 during the entire period of training. Equipment outlays for optometry students are $300 to $1,000. Students in other professions have smaller equipment expenses.

State Funds

The total of state government support for health professional education was $1.5-billion in Fiscal Year 1972. Of that, $999.6-million was for operating expenses of the public schools. Subsidies to teaching hospitals amounted to another $243.6-million; support for private schools was $64.7-million; payments to other states for educating health professionals were $6.1-million. In addition, states spent a total of $219.2-million for capital improvements and new construction of health schools, and $13.8-million to aid students.

State support of health professional schools is greater than the Federal support shown in Table 10, if the latter's patient care payments are excluded. The amount of state support varied in 1972 from $95,000 by New Hampshire to $98.3-million by New York. The four states that paid most (and have 32 medical schools) accounted for 30 percent of the total operating funds supplied by states in 1972:

TABLE 9

Averages and Ranges of Annual Tuition by Type of Health Professional School, 1972

Profession	Average tuition			Range of tuition		
	Public schools		Private schools	Public schools		Private schools
	Residents	Non-residents		Residents	Non-residents	
Medicine	$ 798 a/	$1,639	$2,463 b/	$200-1,300 a/	$716-2,700	$1,978-3,075
Osteopathy	2,748 c/	2,922 c/	2,315 b/	c/	c/	1,900-2,995
Dentistry	818	1,736	2,443	400-1,300	650-2,908	1,500-3,025
Optometry	817	1,861	1,951	136-1,600	1,360-2,108	1,826-2,135
Pharmacy d/	452	1,167	1,631	117-1,000	400-2,260	866-2,166
Podiatry	e/	e/	2,105 b/	e/	e/	1,950-2,375
Veterinary Medicine	707	1,701	1,600 b/f/	234-1,800	516-2,400	300-2,900
Nursing: g/						
Baccalaureate	238	867	1,446			
Associate	249	1,002	1,720			
Diploma	349	438	660			

a/Includes one medical school that lists $650 fees and no tuition.

b/One private school in medicine, osteopathy, podiatry, and veterinary medicine has different tuition for residents and non-residents. In these instances the non-resident, or higher, tuition was used to arrive at ranges and average tuition.

c/One school of osteopathy is publicly supported.

d/Ranges and averages for schools of pharmacy are derived from a sample of 14 private and 40 public schools. Non-resident tuition in public schools is based on a sample of 14 schools.

e/All podiatry schools are private.

f/Two schools of veterinary medicine are private, although they receive state support.

g/Average tuition for schools of nursing are based on 1971-72 data supplied by the National League for Nursing. Averages are derived from a sample of 44 diploma nursing schools, 224 associate degree schools and 98 baccalaureate schools. Where private schools had different tuition for residents and non-residents, the non-resident, or higher tuition were used. Ranges were not available.

TABLE 10

HEW Obligations to Health Professional Schools, by Type of Activity, 1969-1974

Type of activity	1969	1970	1971	1972	1973	1974 estimate a/
Total	$940.5	$1,018.4	$1,104.9	$1,291.2	$1,453.2	$1,560.1
Research and development grants and contracts b/	390.3	367.0	420.9	573.3	634.1	785.1
General research support	34.6	32.8	32.0	30.9	12.4	45.5
Training and fellowships	185.1	237.1	218.5	229.0	194.0	150.0 c/
Institutional support	93.4	128.1	158.9	287.9	339.5	330.6 d/
Formula/capitation grants	50.9	60.7	61.3	181.1	200.6	219.9
Special project grants	42.5	67.4	97.6	87.4	123.0	89.9
Other e/	---	---	---	19.4	15.9	20.8
Health services and child development	14.1	17.0	28.1	41.2	42.8	45.0
Construction f/	140.8	145.2	127.7	31.7	85.3	138.8 g/
Scholarships	17.8	26.3	32.5	35.0	56.0	74.1 h/
Other i/	64.4	64.9	86.3	62.2	89.1	91.0 j/

SOURCE: U.S. Department of Health, Education and Welfare, National Institutes of Health, Office of Resources Analysis and Health Resources Administration, Bureau of Health Resources Development, Office of Financial Management.

a/1974 estimates include estimated obligations from released 1973 impounded funds except where otherwise specified.

b/Includes obligations for research contracts equal to $55.7-million in 1972, $94.9-million in 1973 and $117.8-million in 1974.

c/Excludes estimated obligations of $0.3-million from released 1973 impounded funds from the Bureau of Health Manpower Education.

d/Excludes estimated obligation from released 1973 impounded funds from the Bureau of Health Manpower Education as follows: capitation grants--$3.8-million, special project grants--$49.9-million, and other--$15.5-million, totaling $69.2-million.

e/Includes funds for start-up, conversion grants and financial distress grants.

f/Includes research and development and teaching plants, and related facilities.

g/Excludes estimated obligations of $114.0-million from released 1973 impounded funds.

h/Excludes estimated obligations of $2.0-million from released 1973 impounded funds.

i/Includes Health Manpower loans. In 1971, includes Office of Education obligations that should probably have been allocated to training and fellowships.

j/The estimated $58.8-million in loans excludes estimated obligations of $3.0-million from released impounded funds.

New York	$ 98,293,000
Texas	72,982,000
California	71,044,000
Illinois	62,690,000
	$305,009,000

The next six states accounted for 23 percent, so that ten states provided over 50 percent of all state operating funds in 1972.

Direct support for private health professional schools is provided by at least 13 states.* This aid usually is not dependent on stipulated performance of the schools, although there may be informal agreements concerning such matters as admission preference for state residents. California, Tennessee, and New York recently initiated state support for private schools based on enrollment increases.

Federal Funds

Since 1969, HEW support of health professional schools has increased by approximately 77 percent. Grants and contracts for research grew 101 percent, and funds for scholarships and loans rose by 77 percent. The greatest growth was in funds for direct support of institutions, largely as a result of the capitation grant program authorized in 1971 health manpower legislation. Funds for institutional support rose from $93.4-million in 1969 to $330.6-million in 1974,with the capitation program accounting for 67 percent of the institutional awards made in 1974.** Only in the area of training and fellowship awards did the Federal government reduce its support to health professional schools; nearly $185-million was obligated in 1969 for training, but by 1974 the amount had dropped to approximately $150-million. Scholarship and loan funds increased to more than $100-million in 1974. Table 10 summarizes HEW obligations to the health professional schools by type of activity.

Distribution of Federal Funds by Profession

Federal aid for schools has varied greatly from one profession to another. During the past three years, medical and osteopathic schools have received approximately three-fourths of the total of HEW funds for health professional schools. Dental and nursing schools each received from seven to ten percent of the total.

Table 11 shows the distribution of National Institutes of Health (NIH) and Bureau of Health Resources Development (BHRD)*** obligations among the eight professions during each of the past four

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*Alabama, Alaska, California, Florida, Illinois, Michigan, Minnesota, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Texas.

**Excluding $69.2-million of 1973 impounded funds whose disposition was undecided at publication of this report.

***The Bureau of Health Resources Development replaced the Bureau of Health Manpower Education on July 1, 1973.

TABLE 11

Distribution of NIH Obligations and BHRD Awards to Health Professional Schools, by Profession, 1971-1974

Profession	Total NIH and BHRD				Total NIH				Total BHRD			
	Fiscal 1971	Fiscal 1972	Fiscal 1973	Fiscal 1974	Fiscal 1971	Fiscal 1972	Fiscal 1973	Fiscal 1974	Fiscal 1971	Fiscal a/ 1972	Fiscal 1973	Fiscal b/ 1974
	(in millions of dollars)											
Total	$ 854	$1,067	$1,147	$1,397	$ 511	$ 660	$ 672	$ 874	$ 343	$ 407	$ 475	$ 523 c/
	(percent distribution)											
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Medicine	79 d/	78 d/	75 d/	77 d/	94 d/	94 d/	95 d/	95 d/	57	43	44	44
Osteopathy									e/	7	3	3
Dentistry	7	7	8	7	3	3	3	3	14	15	15	15
Optometry	1	e/	1	1	e/	e/	e/	e/	2	1	2	2
Pharmacy	3	2	3	3	1	1	1	1	6	5	6	6
Podiatry	e/	e/	e/	e/	--		--	--	2	1	1	1
Veterinary Medicine	3	2	2	2	2	1	1	1	4	2	4	4
Nursing	6	10	11	10	e/	e/	e/	e/	15	26	26	26

SOURCE: For NIH obligations: U.S. Department of Health, Education, and Welfare, CASE Report, Fiscal Years 1971 and 1972. For 1973 and 1974, the data were obtained from National Institutes of Health, Office of Resources Analysis.

For BHRD obligations: Health Resources Administration, Bureau of Health Resources Development, Office of Financial Management.

NOTES: The Bureau of Health Resources Development replaced the Bureau of Health Manpower Education on July 1, 1973. The 1973 and 1974 data exclude BHRD obligations to schools of allied and public health.

Numbers may not add to totals due to rounding.

a/Data on loans excluded from 1972 distribution.
b/1974 allocation of obligations by type of school based upon distribution of actual total awards by type of school for FY 1973.
c/Excludes $117.4-million in estimated obligations from released 1973 impounded funds. See footnotes to Table 10 for details.
d/Separate data on NIH obligations to osteopathic schools are not available and these obligations are merged with those to medical schools.
e/Less than $500,000.

years. The bulk of NIH funds has gone to medical and osteopathic schools; very few of the research funds, or of the increase in research funds in recent years, have gone to any of the other professions.

For health manpower funds, however, the situation is somewhat different. Although medical schools received the largest amount of BHRD support during 1971, 1972, and 1973, their share of total BHRD obligations decreased from 57 percent in 1971 to 44 percent in 1974, while the proportion of funds for nursing increased from 15 percent in 1971 to 26 percent in 1974. These changes reflect the implementation in 1972 of the capitation grant program and increased amounts of student assistance.

During 1972, obligations from Federal sources, excluding patient care revenues, were equal to more than one-third of total financial support for health professional schools--$1.3-billion of the $3-billion spent by health professional schools that year. Although 1973 expenditures of the schools are not yet available, it is unlikely that the Federal government's share of support will have diminished.

Chapter 3

EDUCATION COSTS IN THE HEALTH PROFESSIONS

This chapter presents estimates of the average annual education costs per student in eight health professions for the school year 1973, based on a survey of 82 schools. It also identifies the major components of education costs within each profession and outlines the cost-finding methodology used in this study. More detailed data on each of the eight professions are in Chapters 5 through 12; the methodology is described more fully in Part III.

Health professional schools often are multipurpose institutions that educate a variety of students and also serve as centers for research and patient care. Although some proportions of clinical practice and research contribute to education, many schools engage in these activities because patient care and biomedical research are goals in themselves--and occasionally have budgets several times larger than that for education. Where this is the case, the problem in cost analysis is to determine what portion of the institution's costs are properly attributable to its educational programs. To this end the study group, as others who have examined costs of education,* classified the programs of each school into education, research, and patient care. The education program is defined to include not only the activities that are exclusively for the instruction of students, but also those portions of research and patient care considered essential to education.

Complexities of Estimating Education Costs

There are a number of major difficulties in defining the many activities in a health professional institution and relating them to the products of the institution.

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*See, for example, Thomas J. Campbell, *Program Cost Allocation in Seven Medical Centers: A Pilot Study* (Washington: Association of American Medical Colleges (AAMC), 1968); Augustus J. Carroll, *Program Cost Estimating in a Teaching Hospital* (Washington: AAMC, 1969); John Koehler and Robert Slighton, *Activity Analysis and Cost Analysis in Medical Schools* (Santa Monica, California: July, 1972); Warren W. Gulko, *Program Classification Structures* (Boulder, Colorado: National Center for Higher Education Management Systems at Western Interstate Commission for Higher Education, 1972); and AAMC, *Undergraduate Medical Education: Elements-Objectives-Cost* (Washington: AAMC, 1973).

Multiple and Interrelated Products. The educational process in the health professions comprises instruction and some portions of patient care, research, and other activities in which faculty must engage to teach effectively. But there is little agreement on the size of the portions of these activities that should be included in determining the cost of health professional education. And in several of the professions, education--particularly education of first degree students--is only a modest part of total institutional activities. A quotation from a health care administrator describes one situation:

> Administrators in medical education are well aware of the fact that medical schools are engaged in much more than producing M.D. degrees, that they are the major producers of medical research, patient care, postgraduate and continuing medical education, and a wide spectrum of health science personnel, ranging from doctoral and postdoctoral candidates to technicians. In the middle of this spectrum, small in numbers but large in focus, are the M.D. candidates. It is their small number, however, that is used as the numerator by those who compute the costs of medical education.*

Table 6 in Chapter 2 shows the extent to which students seeking other than the first professional degree participate in health professional education. In medical schools there are more students enrolled in other programs than there are M.D. candidates. Veterinary medicine and pharmacy schools also have large numbers of graduate students.

Joint Activities. The processes of educating the various types of students are interrelated. House officers receive instruction and, in turn, instruct other students; the education of dental auxiliaries within the dental school helps to train dental students for the employment of such personnel in dental practice settings. A single faculty member may contribute to a number of programs simultaneously. In medicine, about 60 percent of faculty contact with medical students is provided jointly with patient care. In dentistry, optometry, podiatry, veterinary medicine, and nursing, much of the instruction is provided in the clinical setting.

Different Settings Among Professions. Educational concepts and structures vary widely among professions. In schools of medicine and osteopathy, and diploma nursing, teaching clinics essential to the education program are a part of larger patient care programs; in schools of dentistry, optometry, podiatry, veterinary medicine, and the other nursing programs, clinics exist primarily for teaching purposes. These differences require that any general cost-finding method be adapted to each profession.

Imputing Costs without Expenditures. Not all resources used by schools are reimbursed at market value, even though they contrib-

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*Ray E. Brown, "Financing Medical Education," *The Future of Medical Education* (Durham, N.C.: Duke University Press, 1973), p. 179.

ute to the schools' programs. Space and fixed equipment are provided from capital expenditures and may have no current expense charged against them. An imputed depreciation charge, ranging from 2 to 5 percent of acquisition costs in most schools, can be developed from existing financial data.

Volunteer faculty supplement regular faculty in the clinical sciences instruction programs and also expand and enrich the educational experience for students. Their contributed services represent a substantial investment of time, particularly in schools of medicine, osteopathy, and podiatry. It is difficult to measure and impute a dollar value to volunteer time.

What Constitutes Education Costs

A part of each institution's cost is clearly attributable only to the education program. These cost items include teaching activities and the portion of joint activities, such as clinical teaching, that are conducted for the benefit of students. This part of total costs, plus a share of general support costs, are the costs of instruction. Instruction costs are those incurred principally because there is an education program.

The study group believes, however, that instruction costs reflect only part of the cost of educating health professionals. Such education in the United States today usually is conducted in a setting of quality clinical practice and biomedical research. Accordingly, the study group has interpreted the Congressional charge to estimate "education costs" as one of identifying the full cost of the educational program. Therefore, the costs of education are defined to consist of instruction costs plus those portions of a school's patient care and research programs that are considered essential to education.

The Congress requested average historical costs per student. This report presents average historical costs for 1972-73 based on a consistent methodology applied to a sample of 82 health professional schools. The study group's sample of 82 health professional schools was selected to represent a range of sizes, locations, magnitude of sponsored programs, and other characteristics deemed to influence education costs. The sample size by profession is presented in Table 12; the characteristics of the sampled schools in each profession are discussed in Chapters 5 through 12, and the sampling methodology is described in Part III of this report.

In brief, the methodology used to determine education costs is as follows: first, instruction costs are computed. Then, judgments are made to determine the amounts of research and patient care activities that are essential to education. Finally, education costs are divided by the number of first degree students to determine costs per student.

Instruction costs are defined as costs directly related to the instruction of students. They include the costs of teaching activities, such as lectures, laboratory sessions, and preparation for these activities; a portion of other activities that contribute

TABLE 12

Number of Schools Sampled in Estimating
Costs of Health Professional Education, 1972-73

Profession	Total a/	Sampled schools	
		Number	Percent of total
Medicine	104	14	13
Osteopathy	7	3	43
Dentistry	50	8	16
Optometry	12	4	33
Pharmacy	73	10	14
Podiatry	5	3	60
Veterinary Medicine	18	5	28
Nursing	1,377	35	3
Baccalaureate	293	14	5
Associate	543	8	1
Diploma	541	13	2

a/Totals include the number of schools which had graduated at least one class by 1972-73.

simultaneously to the instruction of students as well as to research or patient care; and a portion of administrative and scholarly activities that generally support all programs of the institution.

The study group identified a set of thirteen major activities in health professional schools, shown in Table 12. These activities, which were identified through extensive field testing and discussions with faculty and administrators, are the consistent basis for defining instruction costs.

Faculty Costs. The study used faculty activity analysis to allocate faculty costs to instruction, research, and patient care. Faculty are the most important cost element in health professional education. Their compensation is the largest single item of cost and their activities govern other cost items, such as secretaries, technicians, and physical facilities.

At the sampled schools, the study group requested faculty to keep records of time spent in each of the activities listed in Table 13 for one week of the 1973 spring semester.

The percentage of time spent in the various activities was used to allocate faculty costs to activities. As a check on the validity of using a single week's data, a follow-up analysis was undertaken at a small sample of schools during the 1973 fall semester; it disclosed little aggregate difference in total costs.

Activity analysis was selected for use by the study group because it permits partial validation of faculty responses. It also allows the judgments used in estimating instruction and education costs to be modified and enables the recomputation of costs without extensive additional data.

Table 14 shows the distribution of faculty time within each profession by activity. Teaching, research, and patient care activities are allocated directly to the respective programs. Joint activities and general support activities, which account for roughly 50 percent of faculty time, are allocated to programs according to consistent rules:

- Joint activity costs are allocated to instruction to the extent they were incurred because of the educational program*
- General support activity costs are allocated to programs in proportion to the distribution of other faculty costs.

Non-faculty and general support costs are allocated to instruction, research, and patient care on the basis of special studies by the school, or, lacking those, on some other appropriate basis, such as faculty costs, total direct costs, or numbers of different types of students.

Not all resources used by schools are reimbursed at market value even though they contribute to the schools' programs. Facilities are provided from capital expenditure budgets; the study group includes facility depreciation in a school's costs by applying standard accounting methods to acquisition costs. Volunteer faculty time incurs no actual expenditure, although it can be a substantial contribution in some schools of medicine, osteopathy, and podiatry. Difficulties in measuring volunteer time and its varied functions,

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*Chapters 5 through 12 explain specific procedures and percentages used in each of the eight health professions. Part III of the report describes in detail the methodology used and the underlying assumptions.

TABLE 13

Faculty Activities in Health Professional Schools, 1972-73

Activity	Definition
Teaching Activities	
Teaching	Formal teaching, in classroom, laboratory, clinical or other setting. Patients may be present, but for demonstration purposes only. Topic oriented. Students always present.
Preparation for teaching	Preparation for teaching activities in current term including preparation for clinical activities.
Curriculum development and evaluation	General curriculum development and evaluation; teaching support activities; preparation for courses to be taught in future terms.
Joint Activities	
Joint teaching and patient care	Teaching/patient care. Patient care activities with students present. Clinical, surgical, or laboratory procedures, either being conducted by faculty with students observing, or by students with faculty member supervising.
Joint research and teaching	Research and teaching. Students present.
Research Activities	
Independent research	Independent research including research administration. No students present.
Patient Care Activities	
Patient care	Patient care in any setting. No students present.
Hospital/clinical administration	Hospital or clinic administration
General Support Activities	
Administration	General administration and other internal service to the institution.
Service	Service to profession and in a professional capacity to outside organizations.
Professional development	Activities to keep abreast of developments in faculty member's field.
Writing	Professional writing other than research findings.
Absence	Absence from professional duties due to illness, vacation, sabbatical, other leave.

TABLE 14

Distribution of Faculty Time in Health Professional Schools by Activity and Profession, 1972-73

Activity	Medicine	Osteopathy	Dentistry	Optometry	Pharmacy	Podiatry	Veterinary Medicine	Nursing
Total	100%	100%	100%	100%	100%	100%	100%	100%
Teaching activities	21	36	35	39	48	47	30	58
Teaching	8	12	14	16	17	18	11	13
Preparation for teaching	9	19	14	17	23	23	13	32
Curriculum development and evaluation	4	5	7	6	8	6	6	13
Joint activities	18	26	25	27	7	29	16	20
Joint teaching and patient care	15	26	24	26	4	29	13	20
Joint teaching and research	3	0	1	1	3	0	3	0
Research activities	16	2	9	4	9	1	18	1
Patient care activities a/	10	5	5	4	3	8	5	0
General support activities b/	35	31	26	26	33	15	31	21

NOTE: These figures show the distribution of faculty time by the broad activity categories used in the study. Chapters 5 through 12 show distribution of faculty time in the instruction of first degree students for each profession.

a/Includes hospital/clinical administration

b/Includes administration, service, professional development, writing, and absence.

however, have caused the study group to omit cost imputations for volunteer faculty from the costs presented in this report.*

Table 15 shows the percent distribution of instruction costs and their major components for each profession.

TABLE 15

Distribution of Components of Instruction Costs, by Profession, 1972-73

Profession	Total	Faculty a/	Other direct a/	Indirect a/	Clinic a/
Medicine	100%	48%	31%	21%	0%
Osteopathy	100	35	18	47	0
Dentistry	100	37	28	35	0 b/
Optometry	100	30	19	19	32
Pharmacy	100	30	21	49	0
Podiatry	100	30	11	59	0 b/
Veterinary Medicine	100	31	28	15	26
Nursing					
Baccalaureate	100	46	22	32	0
Associate	100	48	18	34	0
Diploma	100	55	12	33	0

a/Percentages were derived by dividing average cost per student of each component by average instruction cost per student.

b/Included in the other cost components since it was not possible to distinguish clinic costs from other costs at all the sampled schools.

Other Education Costs. In addition to instruction, there are portions of the research and patient care programs considered essential to education. Clinical instruction cannot be provided without patient care. Students must be exposed to modern techniques of biomedical research and clinical procedure, the competence of the faculty as teachers must be maintained, and an appropriate mixture of faculty skills and scholarly interaction must be provided.

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*To estimate what volunteer faculty time might mean to costs if it were included, the study group asked a sample of volunteers to record time spent instructing students. Costs were imputed to these times on the basis of the average annual departmental salary in medicine and the average annual associate professor's salary in osteopathy and podiatry. The imputations averaged $550 per student in medicine, about $625 in podiatry, and about $100 in osteopathy. Schools of other professions make little use of volunteer faculty in the strict definition, although some of their pay scales for part-time faculty are so low as to suggest that these instructors are "volunteering" some time.

Determining how much of a school's research and patient care is essential to the educational program requires subjective judgments, differing from one profession to another. The study group obtained these judgments by convening three seminars of educators and administrators from schools of medicine, dentistry, and veterinary medicine respectively.* The participants in each seminar were charged with the task of assembling, on paper, the curricula, faculty, other personnel, depreciation, and administrative processes that would constitute an effective school of a specified size. Through this process, the judgments of experienced educators and administrators were systematically and openly arrived at and explicitly stated.

A summary of the resulting judgments on amounts of faculty time in research and patient care considered essential to education is shown in Table 16. These judgments are expressed as percentages of faculty time spent in instructional activities. In computing research and patient care costs, the amount included in education costs is the actual cost incurred by the school, on a departmental basis, not to exceed the amounts specified for each profession. The figures presented in Table 16 reflect a consensus among seminar participants of prevailing concepts of education in the profession--no effort was made to construct a health professional school of the future. The study group also computed education costs based on both a 50 percent increase and a 50 percent decrease in the research ratios in medicine, dentistry, and veterinary medicine in Table 16 with resulting moderate changes in education costs but with no significant change in the measure used as the basis for financing.** Results of these computations are reported in the respective professions Chapters, 5, 6, and 11.

Education costs are computed by adding the research and patient care costs per student to instruction costs per student.

Average Annual Education Costs per Student

Table 17 presents the average education costs per student for 1972-73 in each of the eight health professions; it also shows the range of costs in each profession.

Table 18 displays education costs by their principal components--instruction, and the amounts of research and patient care considered essential to education--and helps to explain the differences in per student costs among the professions. Instruction costs

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*These professions were selected because it was presumed that only in these professions did independent research and/or patient care activities assume large proportions. In the remaining professions, except osteopathy, which was treated identically with medicine, all research and patient care costs were allocated to education.
**Discussed in Chapter 4.

TABLE 16

Faculty Research and Patient Care Activities Considered Essential to Education

Profession	*Independent research*	Patient care
Medicine and Osteopathy	Basic sciences: up to 67% of faculty instruction costs. Clinical sciences: up to 30% of faculty instruction costs.	Balance of joint teaching and patient care not already included in instruction.
Dentistry	Basic sciences: up to 67% of faculty instruction costs. Clinical sciences: up to 20% of faculty instruction costs.	None--all clinical teaching costs already included in instruction.
Veterinary Medicine	Basic sciences: up to 25% of faculty instruction costs. Clinical sciences: up to 10% of faculty instruction costs.	None--all clinical teaching costs already included in instruction.
Optometry, Pharmacy, Podiatry, and Nursing	No maximum: all research expenditures included in education	Intramural faculty patient care--all clinical teaching costs already included in instruction

NOTE: The amount included in education costs in no case exceeds the actual amounts of research and patient care available in each department.

TABLE 17

Average and Range of Annual Education Costs per Student
by Profession, 1972-73

Profession	Average	Range
Medicine	$12,650	$6,900 - $18,650
Osteopathy	8,950	6,900 - 12,350
Dentistry	9,050	6,150 - 16,000
Optometry	4,250	3,750 - 4,750
Pharmacy	3,550	1,600 - 5,750
Podiatry	5,750	4,400 - 6,700
Veterinary Medicine	7,500	6,050 - 10,500
Nursing		
Baccalaureate	2,500	1,200 - 4,050
Associate	1,650	1,050 - 2,150
Diploma	3,300	1,850 - 4,850

NOTE: Dollars are rounded to nearest $50

for medicine, osteopathy, dentistry and veterinary medicine fall within a narrow range from $6,550 to $8,000 while education costs for the same four professions range from $7,500 to $12,650. The addition of $5,000 per student in research and patient care costs for medicine, $2,450 for osteopathy, $1,050 for dentistry, and $800 for veterinary medicine account for these differences. Table 18 also shows the ratios of education costs to instruction costs, which highlight the amount of research and patient care deemed essential to education in each profession.

Variations in Cost

Time limits for this study precluded detailed analysis of the reasons for variations in costs among the schools in any profession. But, in response to the Congressional charge, the study group attempted to identify the major factors that affect costs. A summary of the results of that effort is presented in this section; greater detail on costs factors in each profession is presented in Chapters 5 through 12.

TABLE 18

Components of Average Annual Education Costs per Student by Profession, 1972-73

Profession	Total education costs	Components			Ratio of education costs to instruction costs
		Instruction	Research	Patient care	
Medicine	$12,650	$7,650	$3,250	$1,750	1.65
Osteopathy	8,950 a/	6,550	400	2,050	1.37
Dentistry	9,050	8,000	1,050	0 b/	1.13
Optometry	4,250 a/	4,000	200	0 b/	1.06
Pharmacy	3,550	2,600	800	150	1.37
Podiatry	5,750	5,550	50	150	1.04
Veterinary Medicine	7,500	6,700	800	0 b/	1.12
Nursing					
Baccalaureate	2,500	2,500	-	-	1.00
Associate	1,650	1,650	-	-	1.00
Diploma	3,300	3,300	-	-	1.00

NOTE: Dollars are rounded to nearest $50

a/Totals do not equal the sum of the components due to rounding. See Tables 80, 94, and 130, respectively.
b/Clinic costs included in instruction.

To simplify the examination of cost factors, the study group focused on instruction costs--those costs directly related to the instruction of first degree students. Four components were considered: faculty costs, other direct costs, indirect costs, and clinic costs. (A distribution of total costs in these components for each profession is shown in Table 15.)

The sample of schools in most of the professions was too small to justify the use of elaborate statistical techniques, but the study group attempted to separate the cumulative effect of cost variation into its component parts by successively estimating the variation in instruction costs as if there were no change in each of the four components. Table 19 contains the results of this analysis. It indicates that, for most professions, variation in faculty costs is the biggest reason for variation in total instruction costs.

TABLE 19

Effect of Variation in Instruction Costs when Holding Individual Cost Components Constant

Profession	Instruction costs	Percent reduction (increase) in cost variation			
		Faculty	Other direct	Indirect	Clinic
Medicine a/	$7,650	44	50	9	NA
Osteopathy	6,550	60	23	4	NA
Dentistry a/	8,000	36	26	20	NA b/
Optometry	4,000	66	45	(79)	(105)
Pharmacy a/	2,600	15	22	18	NA
Podiatry	5,550	47	24	35	NA b/
Veterinary Medicine	6,700	1	29	8	5

NOTE: This analysis was not applied to schools of nursing.

a/ Standard deviation, rather than the range was used in determining variation in these professions.

b/ Included in the other cost components since it was not possible to distinguish clinic costs from other costs at all the sampled schools.

In order to evaluate the reasons for variations in faculty costs, the study group analyzed both the averages of faculty compensation and the ratios of instructional faculty to students. The latter item is computed by dividing the number of faculty by the number of first degree students, and multiplying the result by the percent of faculty time spent in the instruction of first degree students.

Within each profession, differences among the schools for average faculty salaries were relatively small. The main reason for variation in instruction costs was the instructional faculty/student ratio. Table 20 contains the averages and ranges of this ratio in each profession. The ranges around the average vary from about 30 percent in osteopathy to nearly 100 percent in dentistry, pharmacy, and diploma and associate degree nursing.

TABLE 20

Average and Range of Instructional Faculty/Student Ratios by Profession, 1972-73

Profession	Average	Range
Medicine	1:8	1:6 - 1:13
Osteopathy	1:13	1:10 - 1:14
Dentistry	1:7	1:3 - 1:9
Optometry	1:11	1:8 - 1:15
Pharmacy	1:22	1:15 - 1:50
Podiatry	1:10	1:8 - 1:12
Veterinary Medicine	1:9	1:7 - 1:13
Nursing		
Baccalaureate	1:13	1:8 - 1:22
Associate	1:14	1:9 - 1:25
Diploma	1:7	1:6 - 1:14

NOTE: The instructional faculty/student ratio is defined as the ratio of full-time equivalent faculty time spent in instruction of first degree students to the number of first degree students.

Organization factors, such as a school's type of control or university affiliation, are presumed to affect costs. The study group's findings in this area, however, were inconclusive. In medicine, costs were lower for public schools than private schools; in dentistry, optometry, and pharmacy, the situation was reversed. In medicine, costs were lower for schools in health science centers than for freestanding or university-based schools; in pharmacy, veterinary medicine, and baccalaurate nursing, the situation was reversed.

The type and quality of a school's output would be expected to have some relationship to its costs. But the data gathered for this study do not enable comparisons on the basis of quality or type of graduate.

Staff of the Institute of Medicine/National Academy of Sciences will make further analyses of cost variations in order to determine, among other matters, the effects of different curricula, traditions, and program emphases.

Methodological Limitations

The study group's methodology permits estimation of education costs under a variety of definitions of education and under different cost allocation assumptions--a feature not provided to date by other methodologies.

Nevertheless, in drawing conclusions about each profession from the sample school data some caution should be used. Cost data presented here are subject to error for a variety of reasons, some inherent in the methodology and others reflecting the time constraints on the study:

- Faculty activities were measured during only one week during the spring of 1973 (except for a small subsample taken in the fall of 1973)
- The sample may not be exactly representative of the universe in each profession
- Procedures for allocating non-faculty costs to programs are rudimentary; detailed workload studies at each school were infeasible within the context of this study.

Chapter 4

CAPITATION, FINANCING, AND EDUCATION COSTS

The Congressional charge requested estimates of average annual education costs per student in the various health professions, and recommendations for using those costs to establish rates for capitation payments. Education costs, as presented in Chapter 3, take into account all the resources essential to an educational program for students working toward their first professional degree.

Education costs alone are not adequate for identifying a school's need for financial support of the educational program. They do not take into account the fact that the patient care and research included in the educational program can generate income, thereby reducing the amount of income needed from other sources to finance education.

A more suitable cost basis for determining capitation payments, in the study group's opinion, is *net education expenditures*. This is the cost of education less the income that the education program receives from research and patient care. Net education expenditures identify that portion of the cost of education not paid for or offset by research and patient care income, which is the portion for which financing is required.

If full education costs were used as the basis for financing health professional education, duplications could arise in funding. Also, the use of education costs, which do not deal with sources of funds, would hamper efforts to analyze the effects on institutions of changes in funding sources. There is a clear distinction between actual resource costs as defined by the education costs presented in Chapter 3, and the financing of these costs as discussed in this chapter.

Estimating Net Education Expenditures

The analysis carried out by the study group at each of 82 sampled schools produced costs for educating first degree students, and for research and patient care programs. As discussed in Chapter 3, some portion of patient care and research costs were included in the educational program. The computation of net education expenditures entails determining the portion of income applicable to the research and patient care included in education, and subtracting this income from education costs. The following points regarding this computation should be noted:

- In schools with one predominant type of student and small research and patient care programs, net education expenditures can be approximated by subtracting total research and patient care income from total institutional expenditures

- Offsetting income from patient care and research are computed separately, thereby precluding a surplus in one program from covering a deficit in the other

- The amount of offsetting income that is subtracted from education costs is limited to the amounts of research and patient care costs that are included in education. If there is not enough income to cover research and patient care costs unrelated to education, then net education expenditures equal education costs.

Procedures for computing net education expenditures are described in detail in Part III.

Table 21 shows for each profession the relationship between average annual education costs for first degree students and net education expenditures, with the income offsets to education identified separately for patient care and research revenues. Adjusting education costs for the offsetting income from these two programs usually reduces education costs.

Net education expenditures as a percentage of average education costs range from 73 percent to 100 percent. The percentages shown in Table 21 represent the portions of education costs that are not funded from research and patient care sources. In schools that have third-party payments available for patient care, such as osteopathy, the offset of those payments is large compared with the offset in schools that have little of this revenue available, such as pharmacy. Similarly, in professions whose schools conduct much Federally-sponsored research, such as medicine, the research offsets are large compared with podiatry, which has little research. These income flows affect the ability of the schools to fund the various components of their educational programs.

Table 22 shows average annual net education expenditures per student and the range of these figures for the sampled schools in each profession.

- The study group *recommends* that the Federal government use net education expenditures as a basis for establishing rates of capitation payments to health professional schools.

The rest of this chapter compares net education expenditures per student in the various professions with presently authorized capitation rates, suggests how the net figures may be used to establish capitation rates, and outlines the study group's recommendations on other policy aspects of capitation support.

TABLE 21

Average Annual Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Student by Profession, 1972-73

	Education costs	Offsetting research revenues	Offsetting patient care revenues	Net education expenditures	
				Amount	Percent of education costs
Medicine	$13,100a/	$2,100	$1,300	$9,700	74
Osteopathy	8,950	100	1,850	7,000	78
Dentistry	9,050	700	950	7,400	82
Optometry	4,250	50	1,050	3,100b/	73
Pharmacy	3,550	450	50	3,050	86
Podiatry	5,750	0	800	4,900b/	85
Veterinary Medicine	7,500	600	1,350	5,550b/	74
Nursing					
Baccalureate	2,500	50	0	2,450	98
Associate	1,650	0	0	1,650	100
Diploma	3,300	0	1,800c/	1,500	45

NOTE: Dollars rounded to nearest $50.

a/The average education cost of $13,100 differs from the $12,650 displayed in Chapter 3, because one school is excluded from the $13,100 calculation for lack of income data.

b/Totals do not equal the sum of the components due to rounding. See Tables 99, 122, and 135, respectively.

c/Cost reimbursement by third-party payers to parent hospitals.

TABLE 22

Average and Range of Annual Net Education Expenditures per Student by Profession, 1972-73

Profession	Average	Range
Medicine	$9,700	$5,150 - $14,150
Osteopathy	7,000	6,350 - 7,800
Dentistry	7,400	5,050 - 13,400
Optometry	3,100	2,550 - 3,400
Pharmacy	3,050	1,600 - 4,950
Podiatry	4,900	3,850 - 5,950
Veterinary Medicine	5,550	4,300 - 7,750
Nursing		
Baccalaureate	2,450	1,200 - 4,050
Associate	1,650	1,050 - 2,150
Diploma	1,500	400 - 2,550

NOTE: Dollars rounded to nearest $50.

Capitation and Financial Stability of Schools

A principal objective of the 1971 Comprehensive Health Manpower Training Act and the Nurse Training Act of 1971 was to provide financial support for education in health professional schools by means of a capitation grant for each full-time student. Federal aid programs for health manpower have long recognized a dependence between the health care delivery system and the performance of the schools in providing for national health manpower needs. The government's interest in a stable base for health professional education has increased along with the Federal share of health expenditures.

Reasons for Federal support of health professional education go beyond the improvement of the health care delivery system. To some extent, an increase in institutional support by means of capitation grants evolved in response to claims of financial distress by health professional schools in the late 1960s and early 1970s. Table 23 shows that more than half of the schools in every profession, except pharmacy and veterinary medicine, received financial distress grants in 1970 and 1971. Although changes in the eligibility criteria and limitations on public schools' access to financial distress funds were the major factors in the decline in distress grants awarded in 1972 and 1973, it is likely that some of the decline reflects the expanded role of capitation support in providing a stable source of financing.*

Federal interest in health professional schools also reflects their status as a national resource of value beyond the boundaries of the states in which they are located. The distribution of schools bears little relation to the distribution of the nation's population, and the mobility of health professionals reduces a state's motives to provide sole support for their training. Federal aid recognizes the schools' status as national resources and supplements state investments in health education.

Without some Federal contribution to the financial stability of health professional schools, there would be growing pressures on the states to assume a larger share of the financial burden of private institutions. Private schools serve as an important resource for the development of health manpower and many of these institutions are leaders in research, patient care, and education. They also provide diversity and flexibility in the educational sector. If states are called upon to increase support for private schools,

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*A U.S. Department of Health, Education, and Welfare (HEW) survey of medical and dental schools receiving financial distress grants in 1971 inquired into the reasons for financial distress in 1970. Of the 58 medical and 27 dental schools responding, 18 medical schools and 12 dental schools cited "reductions in or inadequate Federal, state and/or university support." The explanations given by the remaining dental schools were distributed among a variety of other reasons. Twenty-eight of the remaining medical schools gave no indication as to the reason for financial distress. (HEW, *Financial Distress Study* (December 1971), p. 51.)

TABLE 23

Average Size and Number of Financial Need and Distress Grant Awards in Seven Health Professions, 1970-73

Profession	Financial need grants[a]				Financial distress grants[b]			
	1970		1971		1972		1973	
	Average award	Number of awards	Average award	Number of awards	Average award	Number of awards	Average award	Number of awards
Total		107		115		18		18
Medicine	$379,721	58	$487,632	62	$1,101,714	6	$823,907	7
Osteopathy	367,759	4	365,891	4	360,000	1	340,131	1
Dentistry	383,208	30	457,669	32	560,142	4	483,353	4
Optometry	205,401	8	258,326	9	134,836	2	161,990	2
Pharmacy	45,244	1	109,177	1	575,171	2	77,572	2
Podiatry	162,691	5	173,193	5	67,366	2	391,998	1
Veterinary Medicine	781,725	1	342,513	2	385,518	1	297,642	1

SOURCE: HEW, National Institutes of Health, Division of Research Grants, Information for Management Planning and Coordination System, 1973.

NOTE: Data were not provided for nursing schools.

a/Financial need grants were included as part of the project grant program authorized under Section 772 of the Health Manpower Act of 1968.

b/The financial distress grant program is authorized under Section 773 of the Comprehensive Health Manpower Training Act of 1971.

states may also increase their authority over those schools in such matters as accepting out-of-state students or limiting the geographic mobility of new graduates.* This runs counter to the concept of health professional schools as a national resource and could encourage wasteful duplication of educational facilities in states that previously relied on other jurisdictions for a steady supply of health professional graduates.

- The study group *endorses* a capitation grant program as an appropriate Federal undertaking to provide a stable source of financial support for health professional schools.

Stability of direct support for health professional education, and particularly education toward the first professional degree, can enable institutions to plan and manage programs unaffected by shifting Federal emphasis on such products of those institutions as research and patient care. Future decisions on capitation should assure the predictability and stability of this source of financing.

Capitation as a Source of Income for Schools

The study group employed two criteria in making a judgment on an appropriate level of capitation: the Federal contribution to health education should not be disproportionate with respect to other sources of funds, and capitation grants should be used only as a complement to other existing sources of income, never as a substitute for them.

Health professional schools historically have been supported by a variety of sources, which differ in amount from one profession to another. These sources are tuition, state appropriations, philanthropy, sponsored research, patient care, and other Federal funds. The present proportion of capitation grants in the income of health professional schools is shown in Table 24. Although the quality of the income data in this study is more limited than the cost data, certain general relationships can be seen.

Capitation has averaged 4 to 5 percent of total income in medical schools, but has been larger as a proportion of their education income. In several professions, the study group identified schools for which capitation was more than 30 percent of education income. And, although many nursing schools did not receive any capitation money in 1972-73, for several that did the grants

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*In 1973-74, 89 percent (6,676 out of 7,521) of the first-year places in publicly owned medical schools were filled by state residents. For private schools, the corresponding figure was 50 percent (2,997 out of 5,939 places). (*Journal of the American Medical Association,* 226 (November 1973), p. 911.)

TABLE 24

Capitation as a Percent of Total Income and Education Income by Profession, 1972-73

Profession	Capitation as a ercent of total income a/	Capitation as a percent of education income
Medicine	1-8	5-18
Osteopathy	3-20	8-45
Dentistry	11-25	13-34
Optometry	9-16	13-18
Pharmacy	3-35 b/	6-38
Podiatry	8-16	12-18
Veterinary Medicine	0-4 c/	0-7 c/
Nursing		
Baccalaureate	0-21	0-21
Associate	0-23	0-21
Diploma	0-10	0-48

a/Total income includes the amount of capitation awarded by HEW in 1972-73, not the amount spent and reported by the schools in their financial statements.

b/If the two schools with the highest percentages are omitted from the pharmacy sample, the range becomes 5 to 23 percent.

c/Actual amounts not available from two schools.

amounted to more than 30 percent of education income.* There was no significant difference between public and private schools of any profession in the percentage of education income covered by capitation funds.

In addition to capitation, other sources of education income are teaching and training grants, gifts and endowments, and tuition and fees. In public schools, education income is higher as a proportion of total income than in private schools. In public medical schools, education income averages 57 percent of the total as against 33 percent in private medical schools. The major factor in this difference is the state support received by the public schools, which averages 36 percent of total income.

Revenues from research and patient care also can be large factors in school income. In some private medical schools, income from research exceeds revenues generated for the educational programs (Chapter 5, Table 56). In osteopathy, patient care revenues are the biggest single source of income to the educational institutions, averaging 59 percent in the sampled schools. In dentistry, pharmacy, podiatry, and veterinary medicine, however, income for educational programs is generally larger than revenues from research and patient care combined.

At the time of determining capitation for each profession there was discussion in the Congress, particularly in the Senate, in support of a concept that the basic Federal grant should cover approximately one-third of education costs per student.** This principle seemed to reflect the fact that the Federal government's share is approaching one-third of total national health expenditures.

Table 25 compares the capitation grants authorized in the 1971 legislation, the actual average capitation award for 1972-73, and the average annual net education expenditures calculated for the sampled schools in each profession. The authorizations amounted to approximately 25 to 40 percent of average net education expenditures in all professions except podiatry and nursing. For those two, the percent of net education expenditures covered by the authorized capitation levels was markedly lower.

The relationship between actual average capitation grants and

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*Study staff were informed that many nursing schools did not apply for capitation awards in the belief that other sources of Federal funds would be withdrawn on an equivalent basis.

**In the Senate Report of the Comprehensive Health Manpower Training Act of 1971, it was stated "that it is the intent of Congress that grants will provide approximately one-third of the national average of education costs to schools which make satisfactory progress in increasing enrollment and reducing the time requirement in a training program." This section was deleted in the Conference Report. (U.S., Congress, Senate, *Comprehensive Health Manpower Training Act of 1971*, Conference Report No. 92-398 (October 19, 1971), p. 44.)

TABLE 25

Average Annual Net Education Expenditures per Student, by Profession, 1972-73

Profession	Net education expenditures per student	Authorized basic capitation grant		Average actual capitation grant	
		Amount	Percent	Amount	Percent
Medicine	$9,700	$2,850 a/	29	$1,961	20
Osteopathy	7,000	2,850 a/	41	1,346	19
Dentistry	7,400	2,850 a/	38	1,982 b/	27
Optometry	3,100	800	26	333	11
Pharmacy	3,050	800	26	386	13
Podiatry	4,900	800	16	403	8
Veterinary Medicine	5,550	1,750	32	753	14
Nursing					
Baccalaureate	2,450 c/	346 c/	14 c/	226 b/c/	9 b/c/
Associate	1,650 c/	213 c/	13 c/	139 c/d/	8 c/d/
Diploma	1,500	250	17	214 e/	14 e/

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a/A basic capitation amount of $2,850 has been used, rather than the $2,500, to reflect the $4,000 capitation award made for the students in the graduating class.

b/One school did not receive any capitation award in 1972-73.

c/Per student equivalent.

d/Four out of eight associate degree programs did not receive any capitation award in 1972-73.

e Represents the average for these five schools, since only five out of twelve diploma schools received capitation awards in 1972-73.

average annual net education expenditures also is shown in Table 25. Even though the actual awards include bonus amounts, in no profession did the appropriated funds approximate the authorized levels. Furthermore, except for dentistry, actual capitation awards covered only 20 percent or less of average net education expenditures in 1973.

- The study group *concludes* that a range of capitation between 25 and 40 percent of net education expenditures would help assure the stability of both the public and private institutions, and the maintenance of proportionate levels of state assistance, tuition, and philanthropy.

Capitation within this range should enable schools to maintain present enrollments without incurring financial distress; it also should facilitate planning by the schools. Table 26 shows what the capitation amounts per student would be at 25 percent, 33 percent, and 40 percent of average annual net expenditures in each profession. It also compares those figures with the authorized amounts in the 1971 legislation.

Although capitation could theoretically be established according to a variable formula within a profession in an effort to develop incentives for increasing quality or other specific goals, the data in this study did not provide any guidance with respect to matching quality and costs. Thus, there was no basis on which the study group could discuss alternatives to a flat capitation rate within a profession.

What Capitation Would Cost in Dollar Totals

Under the present legislation, $367-million was authorized for capitation grants to health professional schools during 1974 and $224-million was appropriated. If capitation were set between 25 percent and 40 percent of net education expenditures, $268- to $437 million would be needed to fund the program in Fiscal Year 1975. Comparisons of total amounts for various professional groups, and the distribution by individual professions are shown in Table 27.

Capitation support would provide one result if based on the number of enrolled students, as in the current legislation, and another if based on the number of graduates, as calculated for Table 27. Capitation based on enrollments encourages increased class size; based on graduates it is an incentive to minimize dropouts. Manpower projections are unclear as to the need for further expansion in many of the professions.

- The study group *recommends* that capitation be based on graduates, with appropriate transitional support to schools that have greatly increased their enrollments in the past few years, or have recently changed to a three-year degree program.

TABLE 26

Capitation at Current Authorization Levels and at Different Levels
Average Annual Net Education Expenditures, 1972-73

Profession	Net education expenditures per student	Currently authorized capitation amount	Average net education expenditures a/		
			25 percent	33-1/3 percent	40 percent
Medicine	$9,700	$2,950 b/	$2,450	$3,250	$3,900
Osteopathy	7,000	2,850 b/	1,750	2,300	2,800
Dentistry	7,400	2,850 b/	1,850	2,450	2,950
Optometry	3,100	800	800	1,050	1,250
Pharmacy	3,050	800	750	1,000	1,200
Podiatry	4,900	800	1,250	1,650	1,950
Veterinary Medicine	5,550	1,750	1,400	1,850	2,200
Nursing					
Baccalaureate	2,450	346 c/	600	800	1,000
Associate	1,650	213 c/	400	550	650
Diploma	1,500	250	400	500	600

a/Dollars rounded to the nearest $50.

b/A basic capitation amount of $2,850 has been used rather than the $2,500, to reflect the $4,000 capitation award made for the students in the graduating class.

c/Per student equivalent.

TABLE 27

Aggregate Authorization Requirements For Capitation at Different Levels of Net Education Expenditures by Profession, 1975

Profession	(1) Estimated 1975 graduates a/	(2) Number of years of capitation	(3) 1974 Authorization b/	(4) Capitation costs at 25 percent (1)x(2)x(25% rate)	(5) Capitation costs at 33-1/3 percent (1)x(2)x(33% rate)	(6) Capitation costs at 40 percent (1)x(2)x(40% rate)
Total	96,547			$268,333,100	$354,907,800	$436,366,000
MOD-subtotal	17,735		$238,000,000 c/	$160,375,800	$212,600,200 c/	$265,432,200
Medicine	12,270	4		120,246,000	159,510,000	191,412,000
Osteopathy	778	4		5,446,000	7,157,600	18,713,600
Dentistry	4,687	4		34,683,800	45,932,600	55,306,600
OPPV-subtotal	8,812		41,000,000 c/	26,057,300	34,577,600 c/	41,313,800
Optometry	791	4		2,531,200	3,322,200	3,955,000
Pharmacy	6,330	3		14,242,500	18,990,000	22,788,000
Podiatry	310	4		1,550,000	2,046,000	2,418,000
Veterinary Medicine	1,381	4		7,733,600	10,219,400	12,152,800
Nursing-subtotal	70,000		88,000,000 d/	81,900,000	107,730,000	130,620,000
Baccalaureate	16,100	3		28,980,000	38,640,000	48,300,000
Associate	29,400	2		23,520,000	32,340,000	38,220,000
Diploma	24,500	3		29,400,000	36,750,000	44,100,000

a/Graduates for 1974-75 were estimated by adjusting 1972-73 actual graduates by a percentage increase approximately equal to the actual increase in enrollments realized from 1970-71 to 1972-73.

b/The appropriated amounts for 1974 are $152.5-million for the MOD group, $34.8-million for the OPPV group, and $36.2-million for nursing.

c/Even though the authorized basic capitation grant displayed in Table 26 was less than 33-1/3 percent of net education expenditures per student in all fields except osteopathy and dentistry, the authorized amounts needed to fund total capitation at 33-1/3 percent in 1975 are less than the 1974 authorization in the present legislation. This discrepancy can be explained by the fact that the authorized amounts for 1974 also included funds for bonus enrollment grants in all professions and for small school grants in the MOD group. It is not possible to separate out the amount for basic capitation grants. Funding requirements for basic capitation grants, only, are reflected in column (5).

d/This authorized amount includes bonus enrollment grants in addition to the basic capitation grants.

- The study group *recommends* that capitation not encourage one length of curriculum over another in any one profession.*

Capitation Grants and Education Objectives

Present legislation ties receipt of capitation grants to expanded enrollments, and enrollments have increased considerably in response to this and earlier legislative stimuli. Each institution receiving support also is required to carry out three of nine educationally related objectives specified in the legislation, such as improving the efficiency of the educational program, influencing the career choice and location of graduates, encouraging innovative teaching programs, and attracting the enrollment of minority and women students.

After considering whether future legislation should continue to link capitation awards to specific objectives, it is the judgment of the study group that capitation grants are of limited effectiveness in achieving quantitative objectives other than expanded enrollment.** Since there is considerable uncertainty about the adequacy of the future supply of health professionals,* and considerable dispute on how to calculate these supply figures, the study group concludes that capitation grants should require institutions to maintain existing enrollments, but not require expansion.

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*Since this cost study provides no data on the differences in the average annual cost per student between a three- and a four-year degree program, the capitation amounts reported in Table 27 reflect this neutrality as follows: the capitation payment for every graduate of a medical, osteopathic, or dental school has been estimated by multiplying the annual capitation rate by four, disregarding whether a student had completed a three- or a four-year program. If a cost differential between three- and four-year curricula were known, however, then a neutral capitation position would adjust the capitation payment so that institutions of both types would receive, proportionately, the same size grant.

**A preliminary evaluation of the Health Professions Education Act of 1963 by Paul J. Feldstein indicated the following regarding the subsidies provided to dental schools under that Act:

> The 'quid pro quo' that has been extracted from these schools...has been,...small increases in enrollment and insufficient data to determine whether there has been a change in the mix of their student body, whether there has been curriculum reform for reducing the time required to produce an additional dentist, or whether there have been any changes in the wide variations among schools in costs to produce dentists

(Paul J. Feldstein, *Financing Dental Care: An Economic Analysis* (Lexington, Mass: Lexington Books, 1973), p. 132.)

As to qualitative objectives, the study group believes that capitation programs for the first degree can alter only slightly the geographic and specialty distribution of health professionals, which is more affected by postgraduate training. And, although the study group believes that increases in the enrollment of minority and women students should be encouraged, it is the judgment of the group that capitation is not the most effective policy tool for that purpose.

Other forms of Federal assistance can contribute to health professional education and help to achieve specific national goals at the same time. Redistribution of graduates by specialty, for example, probably can be affected better by project grants and third-party reimbursement policies than by capitation grants. Equality of access to schooling can be enhanced by more student aid programs and project grants.

A major reason for continuation of a capitation program is the role that such a capitation program can play in assuring a stable source of financial support for health professional schools. Although capitation is only one source of income for these institutions, it could become a secure source of educational support if fully funded at authorized levels. At the present time, most of the other Federal sources of income--research grants, teaching and training grants, third-party payments--can no longer be viewed with certainty from one year to the next. This is largely a function of the changes taking place in those programs for reasons not related to the first degree education mission of the health professional schools. Nevertheless, decisions on these other sources of funds greatly affect the total amount of resources available to these institutions, and the amounts that can be allocated for their education activities.

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*One view was stated by Dr. Charles Edwards, Assistant Secretary for Health, HEW, before the 1973 meeting of the Association of American Medical Colleges. Dr. Edwards stated, "I think that clearly we have moved beyond the point at which concerns about a shortage of M.D.s were genuine, if somewhat exaggerated. In my judgment, even more significant is the possibility we may well be facing a doctor surplus in this country." (Charles C. Edwards, M.D., "A Candid Look at Health Manpower Problems," *Journal of Medical Education* 1 (January 1974): 20-21.)

Another view has been suggested in NIH staff papers which indicate that supply and demand for physicians may not be in equilibrium until 1985-90. (Richard D. Lyons, "Shortage of 30,000 Doctors Seen by National Institutes of Health," *New York Times* (January 13, 1974), p. 58.)

- The study group *recommends* that a mechanism be established in the Federal executive and legislative branches to coordinate the implementation of any financing policy for health professional education.

Chapter 5

MEDICINE

This study's examination of medical education and its costs is primarily concerned with the first four years of a physician's professional training. Education toward the first professional degree, however, is only the beginning for most physicians, who go on to internships and residencies in some of the same settings that contributed to their clinical knowledge before the M.D. degree. As house staff members in teaching hospitals, the new physicians further their own education, teach medical students, and provide care for patients.

The function of house staff in the process of medical education is sufficiently important for discussion in the final section of this chapter, although the design of the study was not intended either to examine fully the costs of medical education beyond the first degree or to place a monetary value on the teaching hospital's contribution to education.

Distribution of Physicians

The total number of physicians in the U.S. in 1971 was approximately 345,000, of whom about 325,000 were active in practice or research. **Table 28** summarizes their numbers in various categories per 100,000 population in the most recent years for which reliable data is available.

Geographic distribution of physicians varies substantially from that of the population. The Middle Atlantic census region has almost twice as many physicians for its population as the East South Central region. **Table 29** shows physician distribution in the nine continental census regions per 100,000 population.

For primary care physicians, the distribution ranges from a high of 67 per 100,000 residents in the Pacific Coast region to a low of 35 per 100,000 residents in the East South Central region. In 1970-71 there were 133 counties, containing 483,000 people or 0.2 percent of the U.S. population, with no practicing physician. Over one-half of these counties are in Missouri, Georgia, South Dakota, and Texas.

Physician Manpower and Medical School Enrollments

A widening public subscription in health insurance plans and the advent of the Medicare and Medicaid programs have increased the

TABLE 28

Number of Physicians per 100,000 Population for Selected Years, 1968-71

Professional status	Number per 100,000			
	1968	1969	1970	1971
Total	154	156	159	163
Active Civilian	130	132	134	137
Patient Care	96	97	100	102
Interns/residents	20	22	22	23
Other	14	13	12	12
Active Federal	14	14	15	15
Inactive	10	10	110	11

SOURCE: National Center for Health Statistics, *Health Resources Statistics: Health Manpower and Health Facilities 1972-73*, DHEW, NO. (HSM) 73-1509.

TABLE 29

Geographic Distribution of Physicians per 100,000 Population, 1970-71

Region	Number per 100,000
New England	192
Middle Atlantic (including New York City)	195
South Atlantic (including the District of Columbia)	143
East North Central	130
East South Central	102
West North Central	125
West South Central	115
Mountain	142
Pacific	186
Average	152
Range	102-195

Source: National Center for Health Statistics, *Health Resources Statistics: Health Manpower and Health Facilities 1972-73*, DHEW, NO. (HSM) 73-1509.

population's access to health care. This would suggest an increased need for medical manpower, but predictions of physician supply and demand have varied greatly and recent appraisals by Federal officials have ranged from warnings of an oversupply of M.D.s to continuing projections of a shortage.

Legislative enactments in the mid-1960s were based on the shortage hypothesis, providing money for new schools and new construction at existing schools, as well as incentives to reduce medical student drop-outs and increase the number of medical graduates.

As a result of new Federal and state support, 19 medical schools were established between 1965 and 1972, bringing the nation's total to 112. Existing medical schools increased the size of their entering classes 46 percent from 1965 to 1971.

Some schools also took measures to shorten the four-year program leading to the M.D. degree. Nine established schools and seven developing ones now offer three-year programs. Their effect on numbers of medical graduates is not yet ascertained, but can be expected to constitute a two-phased increase: a one-time rise estimated to total 1,000 between 1965 and 1972 when the three-year programs graduate classes; and a recurring annual 33 percent increase when the three-year programs are fully in operation, assuming that total enrollments remain constant.

Table 30 shows the increase in medical school graduates since 1965.

An expansion of enrollments increases the numbers of physicians, but has little effect on the distribution of physicians geographically and by specialty.

Changing education programs to produce more physicians who will practice in the places and specialties where they are needed is less certain in outcome than expanding enrollments. Several programs are under way, however, in the hope of altering student choices in their eventual type and location of practice. More students and residents are being placed in community health care settings to acquaint them with the problems of medically underserved areas. And curriculum changes are being introduced to give students an earlier clinical experience instead of spending their first two years of school only in the basic sciences. In addition, scholarships and loan forgiveness programs are increasing in order to attract students to a commitment to primary care and underserved areas.

The Professional Schools

In recent decades, medical schools have become institutions of many interrelated programs that serve a wide variety of national, state, and local aims in the health enterprise. Programs of the 112 established and developing medical schools include:

- Instruction for a diverse group, which in 1972 comprised 43,000 medical students, 32,000 house staff, 18,000 graduate students, and 17,000 undergraduates in other disciplines.

TABLE 30

Number and Increase in M.D. Graduates by Source, for Selected Years, 1965-1976

Year	Number of M.D. Graduates	Increase in M.D. Graduates since 1965		Source of increase			
		All schools		New Schools		Increased Enrollment	
		Number	Percent	Number	Percent	Number	Percent
1965	7,400						
1972	9,550	2,150	29	350	16	1,800	84
1976 (est)	12,200	4,800	65	980	20	3,820	80

SOURCE: *Medical Education in the United States*, 1971-72, Journal of the American Medical Association, Vol. 222, No. 8, November 20, 1972.

- Biomedical research and other sponsored programs for which expenditures by all the schools in 1972 amounted to more than $1-billion
- Patient care, which in 1972 constituted about 20 percent of the nation's total of hospital-based services and amounted to nearly $7-billion in health care expenditures.

The wide differences among the schools in size of faculty, enrollments and patterns of expenditures are shown in Table 31.

Selecting the Sample of Schools

Fourteen medical schools, judged to be representative of the 93 established medical schools in the continental United States* were selected for study. The sample was selected largely by means of the mathematical techniques of factoring and cluster analysis. Table 32 shows how the sample of 14 compares with the 93 established schools.

Factor analysis is a means for condensing a large number of variables into a smaller number based on their mathematical relationship to each other. Cluster analysis was used to stratify the schools into similar groups based on the results of factor analysis. Essentially, this procedure assigns a score for each school based on its relative factor values; it then groups schools that fall close to each other.

The sample was chosen essentially at random from among the clusters, taking care, however, that it was representative of the total population for major institutional variables of location, size, ownership, and affiliation.

Costs of Education**

Education costs per student range from $6,900 to $18,650. A summary of education costs per student for the 14 schools of medicine is shown in Table 33.

Average costs per student are roughly 24 percent higher in private schools than in public schools. For the eight private schools***in the sample, average costs are $13,800, ranging from $7,200 to $18,650. At the six public schools, costs average $11,150 per student, ranging from $6,900 to $14,100. Half of the difference in average costs between private and public schools is due to the amount of essential research and patient care costs included in education; the remaining half of the difference is in instruction costs.

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*Medical Education in the United States, 1971-1972, *Journal of the American Medical Association*, 22:8.

**Unless otherwise specified all costs presented in the remainder of this chapter are annual costs.

***Schools 1,5,6,8,9,10,11, and 12 are private schools.

TABLE 31

Summary Characteristics of Total Number of Medical Schools, 1971-72

Summary characteristics	Range
Student mixture	
Medical students	66 - 911
Interns, residents	0 - 990
Graduate, post-doctoral	2 - 500
Faculty composition	
Full-time	43 - 680
Part-time	0 - 354
Volunteer	0 - 200
Full-time faculty/student ratio	1:1 - 1:12
Instructional faculty/ student ratio (from sample of 14 schools) a/	1:6 - 1:13
Program expenditures as a percent of total expenditures (from sample of 14 schools)	
Instruction	32% - 50%
Research	30% - 50%
Patient care	15% - 29%
Regular operating expenditures ($)	$0.8 - 12 million

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a/Computed by dividing the number of faculty by the number of medical students and multiplying the results by the average percent of faculty time in medical student instruction.

TABLE 32

Comparison of Schools in the Sample to Total Number of Medical Schools, 1971-72

Key variables	Sampled schools	Total a/
Organizational relationship		
Public	6	49
Private	8	44
Institutional setting		
Freestanding	1	7
University	5	34
Health science center	8	52
Size of M.D. enrollment		
Less than 400	5	36
More than 400	9	57
Georgraphic distribution		
Northeast	5	28
North Central	2	23
South	4	28
West	3	14

a/Population of 93 approved medical schools within the continental United States with graduates in 1971-72.

TABLE 33

Education Costs per Medical Student, by Components of Cost, 1972-73

Components of cost	Average costs	Range	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13	School 14
Total education costs	$12,650	$6,900-$18,650	$12,800	$14,100	$12,150	$9,600	$16,000	$14,700	$13,750	$13,200	$16,450	$7,200	$18,650	$11,600	$6,900	$10,350
Instruction costs	7,650	4,000-11,000	7,300	9,100	7,400	5,400	9,700	8,400	8,500	8,300	10,300	4,100	11,000	7,000	4,000	6,700
Research associated with education	3,250	2,000-4,950	3,300	3,400	2,950	2,400	4,100	4,000	3,650	3,500	4,200	2,200	4,950	2,400	2,000	2,450
Patient care associated with education	1,750	900-2,700	2,200	1,600	1,800	1,800	2,200	2,300	1,600	1,400	1,950	900	2,700	2,200	900	1,200

NOTE: Dollars rounded to nearest $50.

The major components of instruction costs are shown in Table 34. Faculty costs constitute 43 percent of instruction costs; they include salary and compensation from all sources, such as patient care income received through the school.

Other direct costs include all departmental cost items such as secretarial and clerical salaries, technical staff salaries, supplies and expenses. They also include the portion of house officer costs borne by the medical school that are attributed to the instruction of medical students.* Special studies of house staff activities were conducted at 9 of the 14 medical schools to determine the portion of time house officers spend in medical student instruction. The procedures and major findngs of the house staff survey are described in the attachment to this chapter.

Indirect costs consist of overhead and general support costs, including each medical school's allocated share of general campus and university expenses, as well as depreciation of buildings.

Effect of Non-Cash Costs on Education Costs

Medical schools use several resources for which they incur no expenditure. An imputed depreciation cost for buildings computed uniformly for all medical schools is included in education costs. However, the contribution of volunteer faculty and house officers paid by the hospitals is not included in costs.

House staff at owned and affiliated hospitals are an important resource for many schools in the instruction of medical students. Based on activity analysis studies in nine medical schools, the study group found that:

- House staff spend approximately 60 hours a week at the hospital, with 40 of those hours on patient care, research, or teaching others. Ten percent or 4 of the 40 hours are spent providing instruction to medical students, usually in a joint teaching and patient care setting, and an additional 8 percent or 3 hours per week are spent instructing junior house officers, allied health, and other students
- House officers provide 40 percent of the contact medical students have with their teachers, including full-time and part-time faculty.

Volunteer faculty also are used by medical schools to augment their paid faculty. Working primarily in clinical activities, volunteer faculty:

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*Determining the full cost of house officer contribution to medical education falls within the overall area of education costs borne by teaching hospitals. The Institute of Medicine/National Academy of Sciences plans to conduct studies to determine these costs.

TABLE 34

Instruction Costs per Medical Student by Components of Cost, 1972-73

Components of cost	Average costs	Range	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13	School 14
Total instruction	$7,650	$4,000-$11,000	$7,300	$9,100	$7,400	$5,400	$9,700	$8,400	$8,500	$8,300	$10,300	$4,100	$11,000	$7,000	$4,000	$6,700
Faculty costs	3,300	1,600-4,500	4,500	3,900	3,500	2,000	3,700	3,500	2,600	4,200	3,900	1,600	4,400	4,000	1,800	2,800
Other direct costs	2,700	700-5,000	1,300	3,100	2,000	2,100	4,400	3,700	3,900	2,100	4,700	1,200	5,000	1,200	700	2,600
Indirect costs	1,650	1,200-2,100	1,500	2,100	1,900	1,300	1,600	1,200	2,000	2,000	1,700	1,300	1,600	1,900	1,500	1,300

NOTE: Dollars rounded to nearest $50.

- Provide components of the basic instructional program
- Enhance the quality of education through close physician-student contact
- Offer additional faculty specialties.

The study group surveyed the use of volunteer faculty in each of the 14 sampled schools and found that many schools rely heavily on volunteer services. However, because the schools do not reimburse directly for these services and because there is great variation among schools in the use of volunteers, their contribution has not been included in education costs.

Had they been included, Table 35 shows estimates of the non-reimbursed contribution of house officers and volunteer faculty to medical education, based on special analyses conducted by the study group. The cost of volunteer faculty contribution was computed using average faculty earnings in each department at each school.

Methodology for Estimating Education Costs

The general methodology for estimating education costs in all professions is described in detail in Part III. Specific procedures used for schools of medicine reflect the characteristics of medical education and the complex environment in which medical schools operate.

Faculty costs are allocated to programs on the basis of faculty activity analysis. At each school, faculty members kept a record of their activities for a designated week in the 1973 spring semester.* Table 36 shows how an average full-time faculty member in the basic and clinical science disciplines spent time during the week. A follow-up analysis at some of the schools for a week in the 1973 fall semester revealed little aggregate difference.

Faculty activities are apportioned to instruction, research, and patient care as follows:

- Teaching activities are allocated to instruction according to the proportion of students present or benefiting from that activity
- All joint teaching and research activities in the presence of medical students are allocated to instruction
- A portion of the joint teaching and patient care activities is allocated to instruction on the basis of an analysis conducted by the study group

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*The specific week was chosen after consultation with the school to ensure that it was a representative week for the school as a whole.

TABLE 35

Education Costs, per Medical Student, With and Without Contributed Costs of House Staff and Volunteer Faculty, 1972-73

	Average costs	Range	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13	School 14
Education costs without contributed costs	$12,650	$6,900- $18,650	$12,800	$14,100	$12,150	$9,600	$16,000	$14,700	$13,750	$13,200	$16,450	$7,200	$18,650	$11,600	$6,900	$10 350
House staff instruction costs a/	780	400- 1,600	800	800	400	b/	800	b/	500	1,600	b/	500	1,100	500	800	b/
Volunteer instruction costs	570	100- 1,100	100	100	b/	200	500	700	500	800	400	700	1,000	500	1,100	800
Education costs with contributed costs	14,100	8,800- 20,750	13,700	15,000	b/	b/	17,300	b/	14,750	15,600	b/	8,400	20,750	12,600	8,800	b/

a/Costs paid by hospitals.
b/Data not available.

TABLE 36

Average Hours per Week of Full-Time Basic and Clinical Science Faculty, by Activity, in Sampled Medical Schools, 1972-73

Activities	Basic science	Clinical science
Total	53	52
Teaching activities		
Teaching	5	4
Preparation	8	4
Curriculum development	3	2
Joint activities		
Joint teaching and patient care	1	11
Joint teaching and research	4	1
Research activities		
Independent research	16	7
Patient care activities		
Patient care	--	6
Hospital administration	--	2
General support activities		
Administration	6	6
Service	3	3
Professional development	5	5
Writing	2	1

to determine the additional time required because students are present during these activities. The remaining portion is allocated to patient care. The results of this analysis are shown in the section on allocation of joint activities and the procedures used by the study group are explained in Part III

- Independent research and patient care activities are allocated to research and patient care, respectively

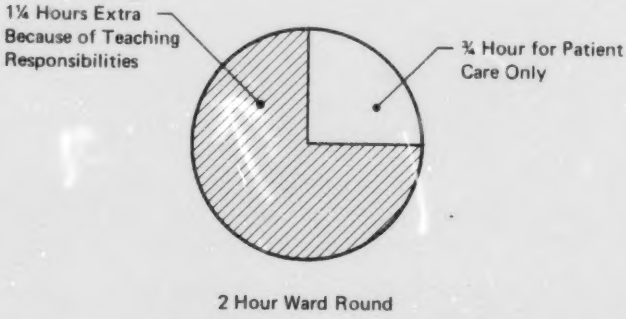
- General support activities are allocated to instruction, research, and patient care based on the faculty time allocated to them.

Other direct costs and indirect costs are allocated to programs based on special studies available at the school, or on some other appropriate basis, such as faculty costs, total personnel costs, number of students in each education program, or space allocated to each program.

Allocation of Joint Activities. Medical schools conduct multiple programs to a greater extent than other health professional schools. Distributing the costs of joint production activities to separate outputs was commensurately a more difficult task in developing cost estimates for medical education. Joint activities are particularly prevalent in the clinical sciences, where about 60 percent of the faculty contact with medical students is in a patient care setting and about 6 percent is in a joint teaching and research environment.

In order to allocate joint costs, the study group used faculty activity analysis to determine the extra time incurred by faculty for teaching when it was conducted jointly with patient care. For example, for a particular morning ward round, a faculty member might have spent two hours conducting patient care and teaching. However, on the basis of past experience, the faculty member would have spent 3/4 hour conducting the same amount of patient care if no students were present. This allocation of time is displayed in Figure 3.

FIGURE 3



Therefore, incremental time incurred because of teaching was 1-1/4 hours; joint time, in which teaching and patient care are both provided, was 3/4 hour.

In order to determine the incremental time incurred for teaching, study staff interviewed nearly 400 clinical faculty members regarding their joint activities. From these interviews, the study developed average incremental time factors by department, as shown in Table 37.

Distribution of Faculty Time. The percent distribution of faculty time allocated to first degree instruction, other instruction, research, and patient care based on the allocation procedures described above is shown in Table 38. On an average, medical schools devote 18 percent of their total faculty resources to the instruction of medical students. The allocations of faculty resources to research, patient care, and the instruction of other students are larger--28 percent, 26 percent, and 28 percent, respectively.

Determining the Costs of Research and Patient Care Essential to Education. In addition to instruction, there are portions of the research and patient care programs considered essential to education because:

- Clinical instruction cannot be provided without patient care
- Students must be exposed to modern techniques of biomedical research and clinical procedure
- Competence of faculty as teachers must be maintained
- An appropriate mixture of faculty skills and scholarly interaction must be provided.

Determining how much of a school's research and patient care is essential to the education program requires subjective judgments. These judgments were secured by convening a panel of medical educators and administrators charged with the task of assembling on paper the curricula, faculty, other personnel, depreciation, and administrative processes that would constitute an effective school of a specified size. The underlying philosophy and the procedures used at the constructed cost seminar are described in detail in Part III.

The consensus of judgments regarding the amounts of research considered essential to education are:

- Basic sciences: up to 0.67 hours in research for each hour of instructional activity
- Clinical sciences: up to 0.30 hours in research for each hour of instructional activity.

In computing the amounts for each school, these judgments were applied to faculty time in instructional activities in each department;

TABLE 37

Percent Incremental Time for Teaching by Department in Sampled Medical Schools, 1972-73

Department	Percent
Anesthesiology	20
Medicine	50
Obstetrics/gynecology	60
Pathology	50
Pediatrics	45
Psychiatry	40
Radiology	40
Surgery	40

TABLE 38

Distribution of Faculty Time by Instructional Activities and Programs in Sampled Medical Schools, 1972-73

Activities or Programs	Average	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13	School 14
							(percent distribution)								
Total	100.0	100.00	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Instruction to first degree students															
Teaching	3.0	2.0	5.6	3.1	2.9	2.5	2.6	2.5	2.3	2.8	4.2	1.8	4.7	2.5	2.6
Joint teaching and patient care	2.6	2.2	4.1	2.3	5.0	3.9	3.2	1.1	2.2	2.0	1.9	1.6	3.2	1.5	1.8
Preparation	3.9	3.1	7.5	4.2	3.8	2.1	3.1	3.5	4.7	3.3	4.4	3.3	3.7	4.1	4.0
Curriculum development	1.9	1.3	2.7	2.4	2.3	1.0	0.7	2.3	1.9	1.9	1.1	1.5	4.5	2.0	1.4
Joint research and teaching	.5	.2	.3	.4	.5	.8	.5	.1	1.1	.6	.7	1.3	.5	.3	.2
Other	5.9	4.0	13.6	6.8	6.4	4.6	5.0	3.8	5.2	5.1	5.9	4.9	6.0	4.9	6.2
Total	17.8	12.8	33.8	19.2	20.9	14.9	15.1	13.4	17.7	15.7	18.2	14.5	22.6	15.3	16.0
Other instruction	27.7	27.4	40.0	33.6	35.4	25.3	26.5	25.5	15.6	28.1	19.9	22.4	26.6	32.5	28.5
Research	27.9	22.7	17.4	18.9	19.4	35.0	34.2	30.7	34.3	33.7	31.1	38.1	18.6	32.2	23.9
Patient care	26.6	37.1	8.8	28.3	24.3	24.8	24.2	30.4	32.4	22.5	30.8	25.0	32.2	20.0	31.6

however, the amount of research included in education in no case exceeds total research available in each department.

To determine the effect of these judgments on costs, the study group computed education costs based on a 50 percent increase and 50 percent decrease in these judgments, resulting in moderate changes in education costs but no appreciable change in net education expenditures, the measure recommended as the financing base. Details of this analysis are shown later in this chapter.

In determining the amount of patient care essential to education, the panel agreed that the entire time spent in joint teaching and patient care activities is necessary for education.

Sources of Variation in Education Costs

Education costs, displayed in Table 39 and summarized in Table 17, include the instruction costs and the costs of research and patient care deemed necessary for education. Forty percent of the variation in education costs is due to the research and patient care costs included in education; the research component accounts for 25 percent, patient care for 15 percent. Instruction costs account for the remaining 60 percent variation in education costs.

Patient Care Costs.

Patient care costs essential to education are based on actual clinical teaching activities of the schools. Variations in patient care costs among the schools reflect the varying amounts of clinical teaching used in the education of medical students, and differences in total cost of conducting clinical teaching--including faculty, non-faculty, and overhead costs.

In general, the study group found that the costs of clinical teaching vary according to:

- Whether a school is public or private; average patient care costs per student are $1,980 in private schools and $1,480 in public schools

- Size of the total clinical program of each school.

Research Costs.

Research included in education costs are based on judgments of the constructed costs panels. These costs vary according to:

- Actual amount of research conducted in each department

- Total costs of conducting research.

In computing research activities included in education, the amount added to education costs is limited by the actual amount of research available in each department. The three departments where the actual research is less than the amounts computed by applying

TABLE 39

Summary of Education Costs per Medical Student, by Components of Cost in Sampled Schools, 1972-73

	Total education	Components		
		Instruction	Patient care associated with education	Research associated with education
Average	$12,650	$7,650	$1,750	$3,250
Range	6,900- 18,650	4,000- 11,000	900- 2,700	2,000- 4,950
Difference between high and low of range	11,750	7,000	1,800	2,950

the judgments are: anesthesiology, pathology, and some of the surgical specialties.

Instruction Costs.

Instruction costs vary greatly among the 14 schools, ranging from $4,000 to $11,000, and account for approximately 60 percent of the variation in education costs. Considering the great diversity among medical schools, especially in their use of instructional resources, differences in costs per student are not unexpected. Major reasons for variation may be elucidated by analyzing the principal components of the differences in per student costs, for example, faculty compensation, and the primary reasons for these differences.

There are several considerations regarding this analysis. First, judgments of cost effectiveness have not been made concerning differences in costs per student. Lower costs are not necessarily better or worse; rather, they reflect the institution's goals, ability to obtain funding, educational philosophy, and management. Second, many factors influence costs, but the analysis only bears on the larger factors. Third, the analysis is descriptive and does not employ stringent statistical techniques because of a limited sample size and a potentially large number of significant variables. Finally, much additional work remains to be done before all the important economic factors affecting medical education are fully identified and explained.

Overall Variation in Instruction Costs per Student. Aggregate analysis of variations among the schools in costs per student has made a number of general observations possible.

(1) Relationship of the 14 Schools to all Schools. Instruction costs in the 14 schools of the sample approximate a normal distribution, as shown in Figure 4. Moreover, the distribution of the sampled schools based on instruction costs shows a close relationship to the distribution of the population of 90 medical schools for which data were available. This classification is based on the mathematical techniques of factor and cluster analysis outlined earlier in this chapter in the section on selecting the sample of schools and is also described more fully in Part III.

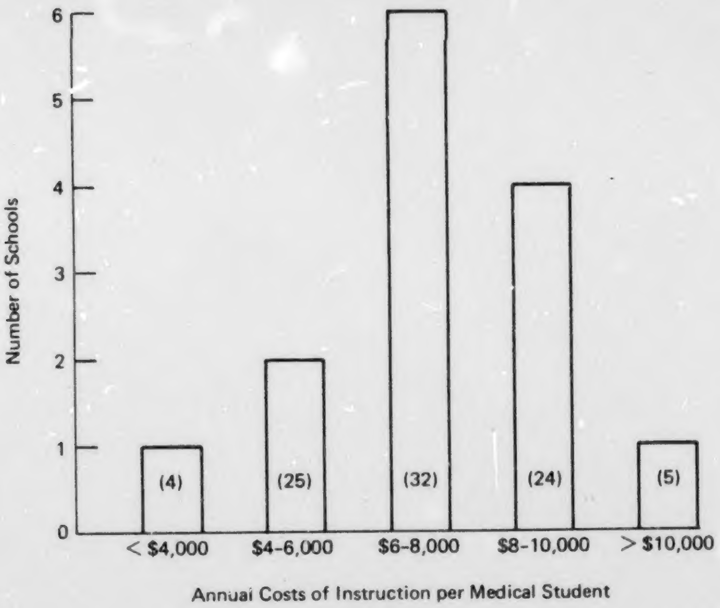
(2) Characteristics of Schools When Grouped According to Costs. To determine the general characteristics of schools with low instruction costs and those with high costs per student, the sampled medical schools were arranged into two groups: those with above instruction costs and those with below average. The characteristics of each group are displayed in Table 40.

From this aggregate analysis, it can be seen that:

- Schools with lower instruction costs per student are more often public, have larger medical student enrollments, are located in health science centers, and have smaller graduate education and research programs.

FIGURE 4

Distribution of Instruction Costs per Medical Student
for Sampled Schools and Total Number of Medical Schools, 1971-72



The number of schools appearing in the parentheses () indicates the number of schools in the total population that are represented by the schools in the sample, based on cluster analysis.

NOTE: The total number of medical schools represents 90 schools for which data were available.

TABLE 40

Characteristics of Sampled Schools with Instruction Costs per Medical Student Below and Above the Average, 1972-73

Characteristics	Schools with costs below the average	Schools with costs above the average
Average instruction costs per student	$6,000	$9,300
Percent of public schools	57%	29%
Average number of medical students	521	455
Average number of other students	350	484
Percent of schools located in health science centers	71%	43%
Percent of schools located in cities with population over two million	29%	57%
Average consumer price index	131.1	135.6
Average medical care index	138.5	139.4
Research effort		
Average dollars of sponsored research	$7.4-million	16.1-million
Average percent of faculty time on research	22%	32%
Percent of graduates in research, academic or administrative fields	6.7%	11.8%

- Schools with higher instruction costs per student are more often private, are located in major metropolitan centers, have larger sponsored research programs, and produce a higher proportion of graduates entering careers in research, teaching, and administration.

(3) Instruction Costs at Public and Private Schools. At the six public schools, costs average $6,850, ranging from $4,000 to $9,100; they are roughly 25 percent higher at the eight private schools, averaging $8,300 per student. Private schools have a wider range in costs, from $4,100 to $11,000.

(4) Relationship between instruction costs per student and enrollments. Numerous studies of the economies of scale in higher education have failed to produce conclusive findings. Costs of education are governed by several interrelated factors, and it is impossible to isolate the single effect of enrollment on costs, particularly from a sample of 14 schools. However, the four sampled schools with the highest enrollments of medical students, averaging 638 students, have average instruction costs of $6,600 per student; the four schools with lowest enrollments, averaging 380 medical students, average $8,800 in instruction costs per student.

(5) Relationship between instruction costs per student and health center affiliation. The eight medical schools in the sample located within health science centers average $7,200 in instruction costs per student, while the other six schools average approximately $8,200.

(6) Components of Instruction Costs. The principal components of average instruction costs are summarized as follows: faculty compensation, 43 percent; other direct costs, 35 percent; and indirect costs, 22 percent.

In addition schools supplement paid faculty with volunteer faculty, house staff paid by the hospitals, and graduate students supported by teaching and training grants. The costs of these resources are not included in instruction costs because they do not involve cash outlays by the schools; however, the varying degrees to which schools use these resources have a strong impact on their instruction costs and therefore on the variation in these costs.

(7) Determining Significant Components of Cost Variation. To determine which cost components have the greatest impact on variation in instruction costs per student, instruction costs were computed with each component held constant at the average level for all schools. The standard deviation in instruction costs was used as a measure of variation. The results show that if average faculty costs per student were the same at all 14 schools, the variation in instruction costs would be reduced by about one-third. The size of the standard deviation and the percent reduction in variation obtained from this approach is shown in Table 41.

TABLE 41

Variation in Standard Deviation of Instruction Costs per Medical Student Due to Differences in Faculty and Non-Faculty Costs, 1972-73

Source of change	Standard deviation	Percent reduction
Standard deviation in instruction costs per student	$2,126	NA
Standard deviation computed by substituting average faculty costs per student of $3,300 a/	1,495	30
Standard deviation computed by substituting average other direct costs per student of $2,700 b/	1,146	46
Standard deviation computed by substituting average indirect costs per student of $1,650 c/	2,020	5

a/Actual faculty costs range from $1,600 to $4,500.
b/Actual other direct costs range from $700 to $5,000.
c/Actual indirect costs range from $1,200 to $2,100.

Variation in the Components of Instruction Costs. The previous section discussed the general aspects of variation in instruction costs among the sampled medical schools. This section presents an analysis of each component of instruction costs.

Faculty costs are the largest single component (43 percent) of medical student instruction costs; they are also a principal factor in variation of costs among the schools, as shown in **Table 42**. This large variation in faculty costs is due to:

- Differences in average faculty compensation among the schools

- The number of full-time faculty for instruction per medical student.

The use of part-time faculty, which varies widely among the 14 schools, is reflected in both factors affecting faculty costs.

Effect of Differences in Faculty Compensation. Data from the sampled schools indicate that average full-time faculty earnings range from $18,400 to $33,600, with an average of $25,900 per year. To determine how much of the difference in faculty costs per student is explained by differences in average faculty compensation, the average faculty compensation was substituted for the actual faculty compensation in each school, and costs were recomputed. This substitution reduced the range in faculty costs from $2,900 to $2,400 per student. To determine the reasons for differing average compensation among schools, the sample schools were placed into two groups, those with faculty compensation below the average and those above the average. **Table 43** displays the major characteristics of each group.

The table shows that differences in average faculty compensation are influenced by a combination of factors including:

- The consumer price index of the area

- Differences in compensation policies among public and private institutions

- Geographic location, with schools in the larger cities offering higher compensation.

Effect of Faculty/Student Ratio. The biggest single reason for differences in faculty costs per student is the amount of faculty resources spent in instructing medical students. Because medical school faculty are engaged in programs other than medical student instruction, a simple ratio of the number of faculty per medical student does not indicate the real level of faculty resources for the instruction of medical students. To develop an appropriate measure of instructional faculty per medical student, three calculations are necessary:

- Determine total number of full-time faculty equivalents (FTEs) in the institution

TABLE 42

Summary of Faculty Costs per Medical Student, in Sampled Schools, 1972-73

Average	$3,300
Range	1,600-4,500
Difference between high and low of range	2,900

TABLE 43

Characteristics of Sampled Medical Schools with Faculty Compensation Below and Above the Average, 1972-73

Characteristics	Schools with faculty compensation below the average	Schools with faculty compensation above the average
Average faculty compensation	$22,000	$28,000
Average consumer price index	131.3	134.8
Percent public schools	67%	25%
Percent of schools located in cities with population over 2 million	16%	62%

- Determine, from activity analysis, the average percent of time spent by faculty in the instruction of medical students

- Multiply those two figures and divide by the total number of medical students.

These computations produce what is termed in this study the instructional faculty/student ratio. Table 44 shows the average and range of instructional faculty/student ratios in the sampled schools.

The remaining differences among schools in faculty costs per student are accounted for by differences in instructional faculty/student ratios. By substituting the average ratio for the actual ratio and recomputing costs for the 14 schools, the range of faculty costs is reduced from $2,400 per student to $100. Therefore, the combination of average faculty compensation and instructional faculty/student ratio accounts for more than 90 percent of the differences among schools in faculty costs per medical student.

To analyze the reasons for differing instructional faculty/student ratios, the study group divided the schools into two categories according to whether the school's instructional faculty/student ratio was above or below the average and then examined differences between the two categories for a number of characteristics, as shown in Table 45.

Based on this analysis, differences in instructional faculty/student ratios for medical students seem to be influenced by:

- The number of medical students in a school. On the average, schools with larger enrollments tend to have fewer faculty per student available for medical student instruction

- State policies on faculty size related to students. The six public schools in the sample have an average instructional faculty/student ratio of 1:9, while the six private schools have a ratio of 1:7 for medical student instruction

- The use of volunteer faculty. Schools with fewer faculty per student tend to use more volunteer faculty; schools with lower instructional faculty/student ratios use 75 percent more volunteer time than the schools with ratios above the average

- The nature of the academic program. Schools with more faculty per student tend to graduate more students who enter research, academics, or administration. The five schools in the sample with high instructional faculty/student ratios graduated almost twice as many students entering research, academic, and administrative fields than the five schools with the fewer faculty per student

TABLE 44

Average and Range of Faculty/Student Relationships in Sampled Medical Schools, 1972-73

Relationships	Average	Range
Number of FTE faculty	366	217 - 662
Overall faculty/student ratio	1:1.3	1:0.9 - 1:2.7
Average percent time for M.D. instruction	18%	13%- 30%
Instructional faculty/ student ratio	1:8	1:6 - 1:13

TABLE 45

Characteristics of Sampled Medical Schools with Instructional Faculty/Student Ratios Below and Above the Average, 1972-73

Characteristics	Schools with instructional faculty/student ratio below the average	Schools with instructional faculty/student ratio above the average
Average instructional faculty/student ratio	1:10	1:7
Average number of medical students	530	456
Percent of public schools	67%	25%
Average volunteer faculty costs per student	$700	$400
Average length of curriculum for medical education	139 weeks	146 weeks
Average percent graduates in research, academics and administration (based on 1967 graduates)	8%	10%
Average percent graduates in research, academics and administration for five schools with the lowest faculty/student ratios	6.5%	
Average percent graduates in research, academics and administration for five schools with the highest faculty/student ratios		11%

- Length of curriculum, which is slightly shorter, on the average, for schools with fewer faculty per student.

Other Direct Costs. Another significant component of instruction costs per student is other direct costs, which include departmental expenses such as secretarial and technical salaries, other non-faculty salaries, fringe benefits, supplies, and expenses. As shown in **Table 46**, variations in these costs account for approximately 50 percent of the variation in instruction costs. **Table 47** displays the components of other direct costs.

To find reasons for variation in other direct costs, the study group sorted schools into two categories according to whether their other direct costs per student were below or above the average. Characteristics of schools in each category were examined for potential reasons for cost variations. **Table 48** displays the major characteristics of each group.

Based on this analysis, variation in other direct costs per student seem to be influenced by:

- Faculty costs per student. Schools with high faculty costs per student tend to have high other direct costs per student

- The ratio of secretarial/clerical costs to faculty costs. Although this tends to be a small source of variation, schools with higher other direct costs average 50 percent more on secretarial/clerical costs per faculty member

- The employee benefits policy of the medical school. Schools with high other direct costs per student average 50 percent higher in their fringe benefits rate than schools with other direct costs below the average.

Average consumer price index and average medical care index appear not to have a significant effect on other direct costs per student. Public schools and schools located in areas other than major metropolitan areas tend to have lower other direct costs per student.

Indirect costs are the third major component of instruction costs. While indirect costs represent 21 percent of instruction costs per student, the variation among the schools is relatively small, as shown in **Table 49**. **Table 50** shows the major components of indirect costs.

To determine the reasons for variation in indirect costs, schools were placed into two groups--those with indirect costs per student below the average and those with indirect costs per student above the average. The characteristics of schools in each group are shown in **Table 51**.

The difference in indirect costs per student is determined primarily by variations in plant operations and general administration and institutional expenses. Few overall conclusions can be drawn from

TABLE 46

Summary of Other Direct Costs per Medical Student, in Sampled Schools, 1972-73

Average	$2,700
Range	700-5,000
Difference between high and low of range	4,300

TABLE 47

Distribution of Other Direct Costs, per Medical Student by Components of Cost, in Sampled Schools, 1972-73

Components of cost	Average	Percent
Total	$2,700	100
Secretarial/clerical salaries	460	17
Other non-faculty salaries[a]	690	26
Fringe benefits	550	20
Equipment	100	4
Supplies and expenses	900	33

[a] Includes house staff salaries paid by the medical school.

TABLE 48

Characteristics of Sampled Schools with Other Direct Costs per Medical Student Below and Above the Average, 1972-73

Characteristics	Schools with other direct costs below the average	Schools with other direct costs above the average
Average other direct costs	$ 800	$2,300
Average faculty costs	$3,000	$3,700
Average ratio of secretarial/ clerical costs to faculty costs	13%	19%
Average percent of employee benefits to total personnel costs	9%	14%
Average equipment costs	$ 50	$ 150
Price indexes		
Average consumer price index	133.2	133.2
Average medical care index	138.8	138.6
Percent Public Schools	50%	33%
Percent of schools in cities with population over 2 million	25%	66%

TABLE 49

Summary of Indirect Costs per Medical Student, in Sampled Schools, 1972-73

Average	$1,650
Range	1,200-2,100
Difference between high and low of range	900

TABLE 50

Distribution of Indirect Costs, per Medical Student, by Components of Cost, in Sampled Schools, 1972-73

Components of cost	Average	Percent
Total	$1,650	100
Administration and institutional services	660	40
Library	210	13
Plant operations and maintenance	330	20
Student services	90	5
Other direct	240	15
Depreciation	120	7

TABLE 51

Characteristics of Sampled Schools with Indirect Costs per Medical Student Below and Above the Average, 1972-73

Characteristics	Schools with indirect costs below the average	Schools with indirect costs above the average
Average indirect costs	$1,400	$2,000
Selected components		
Administration and institutional services	$500	$900
Library costs	$200	$200
Plant operation and maintenance costs	$300	$400
Depreciation costs	$100	$100
Percent of public schools	40%	50%
Percent of schools located in health science centers	75%	50%
Average medical student enrollment	530	430
Average consumer price index	133.8	133.9

the analysis, although schools in health science centers and those with larger enrollments tend to have lower indirect costs per student.

Net Education Expenditures

Net education expenditures show the balance of education costs after each schools sponsored research and patient care revenues are subtracted. They do not represent resource costs in the economic sense, they merely represent the net unfunded portion of education costs. Table 52 shows net education expenditures for 13 sampled schools.

Net education expenditures average $9,700 per student with a range of $5,150 to $14,150. The difference between average net education expenditures for public and private schools is less than 5 percent, although for education costs there is a 24 percent difference. This is because private schools are able to recover greater amounts of research and patient care included in education: their research income offsets average $2,300 per student compared with $1,850 for public schools, and their patient care income offsets average $1,650 per student compared with $700 for public schools. One of the reasons for the lower income offsets in public schools is that many states fund portions of their medical schools' research and patient care activities through general appropriations.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recommends their use as the basis for setting capitation rates. Table 53 shows the relationship of authorized actual capitation, amounts to net education expenditures for the sampled medical schools. Authorized capitation covers about 30 percent of net education expenditures whereas actual amounts awarded cover only 20 percent.

Table 54 displays the percent of each school's net education expenditures covered by a capitation level at 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures.

Sources of Income for Medical Schools

There is considerable variation in the sources of income among medical schools. Public schools generally derive the major portion of their revenue through general appropriations from the state, which cover some research and patient care as well as instructional activities. Revenues from education sources average 33 percent of the total for private schools and 58 percent for public schools. A third of the public schools' education revenues is from state from state general appropriations. Tuition provides a relatively small portion of total revenues; in some schools, tuition is collected by the state or parent university and is not directly available to the medical school. Although Federal capitation forms a

TABLE 52

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Medical Student for Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Sponsored research	Patient care	
1	$12,800	$1,800	$2,950	$ 8,050
2	14,100	1,850	1,800	10,450
3	12,150	650	550	10,950
4	9,600	500	1,200	7,900
5	16,000	1,850	-	14,150
6	14,700	-	1,800	12,900
7	13,750	3,700	-	10,050
8	13,200	2,600	-	10,600
9	16,450	4,650	1,400	10,400
10	7,200	2,050	-	5,150
11	18,650	5,000	4,000	9,650
12	11,600	300	3,050	8,250
13	6,900	NA	NA	NA
14	10,350	2,500	-	7,850
Average	13,100	2,100	1,300	9,700
Range	6,900- 18,650	0- 5,000	0- 4,000	5,150- 14,150

NOTE: Dollars rounded to nearest $50.

a/The average education cost of $13,100 differs from $12,650 displayed in Table 33 because no income data are available for School 13; therefore, its education costs are excluded from the computations on net education expenditures.

TABLE 53

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Medical Student, in Sampled Schools, 1972-73

School a/	Net education expenditures per student b/	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
13	NA	NA	NA	NA	NA
10	$ 5,150	$2,850	55	$1,837	36
14	7,850	2,850	36	1,975	25
4	7,900	2,850	36	2,780	35
1	8,050	2,850	35	1,925	24
12	8,250	2,850	34	2,194	27
11	9,650	2,850	30	1,859	19
7	10,050	2,850	28	1,886	19
9	10,400	2,850	27	1,704	16
2	10,450	2,850	27	1,978	19
8	10,600	2,850	27	1,854	17
3	10,950	2,850	26	1,835	17
6	12,900	2,850	22	1,822	14
5	14,150	2,850	20	1,850	13
Average	9,700	2,850	29	1,950 b/	20
Range	5,150-14,150		20-55		13-36

a/Ranking of schools from lowest to highest net education expenditures

b/Dollars rounded to the nearest $50.

TABLE 54

Percent of Net Educational Expenditures per Medical Student Covered at Different Levels of Capitation in Sampled Schools, 1972-73

School	Capitation at 25 percent of average net education expenditures ($2,450) a/	Capitation at 33 1/3 percent of average net education expenditures ($3,250) a/	Capitation at 40 percent of average net education expenditures ($3,900) a/
1	30%	40%	48%
2	23	31	37
3	22	30	36
4	31	41	49
5	17	23	28
6	19	25	30
7	24	32	39
8	23	31	37
9	24	31	38
10	48	63	67
11	25	34	40
12	30	39	47
13	NA	NA	NA
14	31	41	50

a/Dollars rounded to nearest $50.

relatively small part of total revenues, it constitutes the bulk of unrestricted funds, i.e., those not earmarked for such specific activities as research projects.

Research and patient care provide 40 percent of total revenues of public schools and 50 percent of revenues of private schools. The large variation in the percent of income obtained from patient care reimbursements reflects the different types of faculty compensation plans and the various relationships between medical schools and their teaching hospitals. Differences in the amounts of sponsored research revenues cannot be related to institutional emphasis on research because, as a matter of policy, some public schools do not charge full-time faculty costs to research projects, and therefore generate lower levels of research revenues.

Table 55 and Table 56 show the percent distribution of revenues for public and private schools in the sample.

Effect of Changes in Research Essential to Education

The study group recognizes the dominant role played by judgments in determining the costs of medical education, particularly with respect to the amounts of research and patient care considered essential to education. It should be noted, however, that these judgments were applied to the actual data from the 14 sampled medical schools: patient care activities included in education were restricted to time spent in clinical instruction, and research included in education was limited by the actual amount of research time spent in each department.

To determine the impact of these judgments on costs, the study group computed education costs and net education expenditures for each sampled medical school with a 50 percent change in the level of research deemed essential to education. Tables 57 and 58 show changes in education costs and net education expenditures resulting from a 50 percent increase and a 50 percent decrease in research essential to education. Although there is a moderate change in education costs, there is a change in net education expenditures for only one school, School 6, when the research component is increased, and changes in only five schools when the judgment is decreased.

The primary reason for this small change in net education expenditures is that altered amounts of research included in education costs will usually be offset by an equivalent amount of research income. Net education expenditures will change with a change in judgments only if a minimum or maximum limit is reached. For example, if research revenues are so low that they do not cover that portion of research not included in education, then increasing the amount of research included in education will increase net education expenditures.

TABLE 55

Distribution of Income by Source in Five Sampled Public Medical Schools, 1972-73

Income source	School 2	School 3	School 4	School 7	School 14
Total income	100%	100%	100%	100%	100%
Education income	51	59	67	49	57
Tuition and fees	2	a/	4	4	2
Gifts and endowments	0	3	1	2	0
Teaching/training grants	10	8	11	11	8
Other institutional support	0	1	0	10	0
State general appropriation	34	41	44	18	43
Federal capitation	5	6	7	4	4
Patient care income	23	16	12	13	4
Research income	22	22	21	37	36
Other non-education income	4	3	0	1	3

NOTE: In the sixth public school in the sample, School 13, complete data were not available.

a/Less than 0.5 percent.

TABLE 56

Distribution of Income by Source in Eight Sampled Private Medical Schools, 1972-73

Income source	School 1	School 5	School 6	School 8	School 9	School 10	School 11	School 12
Total income	100%	100%	100%	100%	100%	100%	100%	100%
Education income	22	34	40	35	21	44	27	40
Tuition and fees	4	5	3	4	4	11	3	11
Gifts and endowments	8	9	9	21	6	4	5	a/
Teaching/training grants	6	7	8	4	9	14	15	7
Other institutional support	3	0	0	0	0	7	2	0
State general appropriation	0	10	16	4	0	0	0	15
Federal capitation	1	3	4	2	2	8	2	7
Patient care income	35	9	32	24	16	2	27	31
Research income	15	55	22	38	52	38	46	21
Other non-education income	28	2	6	3	1	16	0	8
General university support	a/	0	0	0	10	0	0	0

a/Less than 0.5 percent.

TABLE 57

Percent Change in Education Costs and Net Education Expenditures, per Medical Student from a 50 Percent Increase in Research Essential to Education, 1972-73

	Basic science research		Clinical science research		Basic and clinical sciences research	
School	Education costs	Net education expenditures	Education costs	Net education expenditures	Education costs	Net education expenditures
1	4%	0%	9%	0%	13%	0%
2	6	0	6	0	12	0
3	5	0	7	0	12	0
4	4	a/	9	a/	13	a/
5	6	0	8	0	14	0
6	6	6	8	7	14	7
7	6	0	8	0	14	0
8	7	0	6	0	13	0
9	5	0	9	0	14	0
10	8	0	7	0	15	0
11	4	0	9	0	13	0
12	4	0	6	0	10	0
13	7	NA	7		14	
14	5	0	7	0	12	0
Average	5	a/	8	a/	13	a/

a/less than 1 percent.

TABLE 58

Percent Change in Education Costs and Net Education Expenditures, per Medical Student from a 50 Percent Decrease in Research Essential to Education, 1972-73

School	Basic science research		Clinical science research		Basic and clinical sciences research	
	Education costs	Net education expenditures	Education costs	Net education expenditures	Education costs	Net education expenditures
1	4%	0%	9%	0%	13%	0%
2	6	0	6	0	12	0
3	5	0	7	2	12	8
4	4	a/	9	6	13	10
5	6	0	8	0	14	1
6	6	6	8	9	14	15
7	6	0	8	0	14	0
8	7	0	6	0	13	0
9	5	a/	8	a/	13	a/
10	8	0	7	0	15	0
11	4	0	9	0	13	0
12	4	2	6	6	10	11
13	7	NA	7	NA	14	NA
14	5	0	7	0	12	0
Average	6	a/	8	2	13	3

a/ Less than 1 percent.

Attachment to Chapter 5

STUDY OF HOUSE OFFICER CONTRIBUTION TO MEDICAL EDUCATION

The study group recognizes that there are several types of costs incurred by teaching hospitals that are primarily costs of education. Although time and resource limitations precluded a comprehensive analysis of all these costs, the study group conducted a pilot analysis of house officer tasks and roles at nine sampled medical schools affiliated with 27 teaching hospitals. The primary objectives of this effort were to gain a better understanding of the multiple roles of house officers in teaching hospitals, and to determine their contribution to medical student education.

Even though there is general recognition that house officers provide a significant portion of medical student instruction, few studies have attempted to define and measure this contribution. Of the 10 previous efforts to analyze house officer activities, only five studies addressed the teaching responsibilities of house officers. None could estimate the house officer contribution to medical education since the studies did not differentiate among the various types of students supervised by house officers.* Only one study recognized that the joint teaching patient care characteristics of a clinical setting require a specific methodology to separate the costs of the instruction portion of these activities from the costs of the patient care provided.

House Officer Roles

The principal professional responsibilities of house officers are to provide patient care, teach medical and other students, and increase their own skills and knowledge.

These interrelated roles of the intern and resident constitute a significant and growing part of the total operating costs of teaching hospitals and medical schools. For example; in 1973, a teaching hospital with 200 house staff would expect to pay over $2-million in stipends and salaries. In addition, these hospitals bear other costs for the house staff program such as insurance, fringe benefits, uniforms and laundry, space, library and records services, and time demands on staff. The medical school would contribute an additional $2-million in faculty, other staff, and indirect support costs for the house staff program. In return, the house officer provides patient care services for the hospital, performs various administrative duties in the hospital, instructs medical students as well as junior house officers and other health professional students, and assists faculty in research.

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*See bibliography.

Study Methodology

The methodology for analyzing house officer activities was similar to that used for faculty. Time logs were sent to 3,400 house officers at nine medical schools along with instructions for recording their activities for a designated week. In addition, several study staff members observed house officers over a 24-hour period to test the methodology and to gain further understanding of the interrelated roles of house officers.

House officers were asked to record all of their activities and roles on a 24-hour basis for a seven-day week. If the house officer indicated that he instructed students, then he was requested to indicate the number of each type of student. Figure 5 is a sample of the time log format. Completed activity logs were received from about 1,400 house officers, constituting a 40 percent response rate.

Analyzing Joint Activities

Joint activities involving patient care and learning, and patient care and teaching are a major portion of house staff activities. A house officer providing patient care under supervision is learning by performing the procedure and by interacting with the attending physician or more senior house officer. In performing a patient care task with no supervision or review, the house officer is generally providing routine patient care, or instructing medical students or junior house officers.

A standardized approach is necessary to allocate these joint activities. Incremental analysis, similar to that used for allocating joint faculty time, was developed to distribute these joint activities. One hundred-fifty house officers (11 percent of total respondents) were interviewed to determine the percent of total time that could be defined as incremental to patient care due to the simultaneous occurrence of teaching, learning, and patient care.

Individual factors were developed for each combination of house officer activity and role; Table 59 summarizes these factors. The time apportioned to instruction was allocated to the various types of students according to the number of students present for that activity.

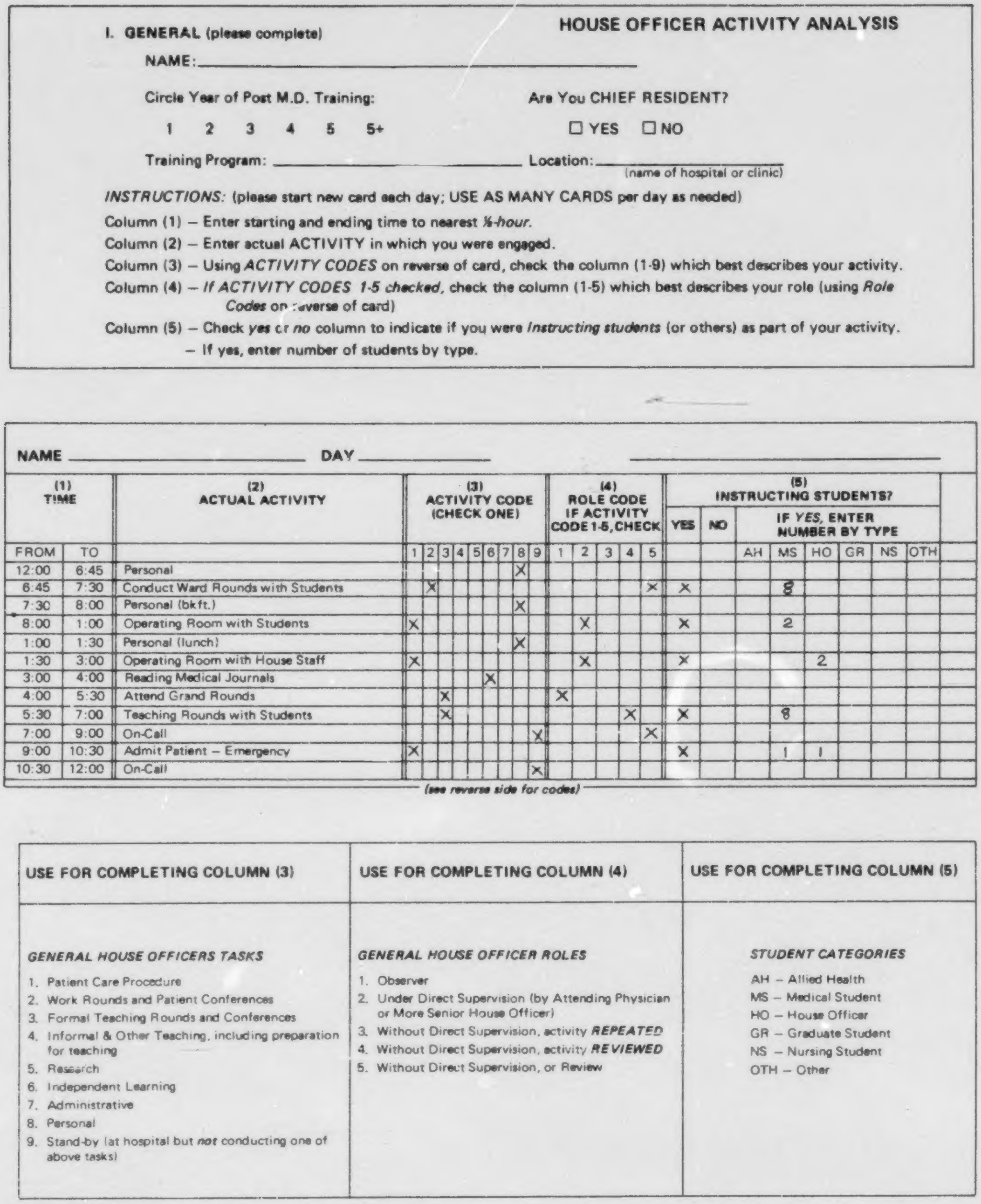
Major Findings

House officers work an average of 58 hours a week. Approximately one-half of their time is spent in providing patient care and about one-third in improving their own skills. Table 60 displays the distribution of house officer activities by school.

Table 61 shows the distribution of house officers' salaries allocated to instruction, research, and patient care based on the time spent in each activity. Approximately 10 percent of house officer salaries is allocated to the instruction of medical students, which ranges from 7 to 15 percent of the house officers'

FIGURE 5

House Officer Activity Analysis Format



I. GENERAL (please complete)

HOUSE OFFICER ACTIVITY ANALYSIS

NAME: ____________________

Circle Year of Post M.D. Training:

1 2 3 4 5 5+

Are You CHIEF RESIDENT?

☐ YES ☐ NO

Training Program: ____________________ Location: ____________________ (name of hospital or clinic)

INSTRUCTIONS: (please start new card each day; USE AS MANY CARDS per day as needed)

Column (1) – Enter starting and ending time to nearest *½-hour.*

Column (2) – Enter actual ACTIVITY in which you were engaged.

Column (3) – Using *ACTIVITY CODES* on reverse of card, check the column (1-9) which best describes your activity.

Column (4) – *If ACTIVITY CODES 1-5 checked,* check the column (1-5) which best describes your role (using *Role Codes* on reverse of card)

Column (5) – Check *yes* or *no* column to indicate if you were *Instructing students* (or others) as part of your activity.
– If yes, enter number of students by type.

NAME ____________________ DAY ____________________ ____________________

(1) TIME		(2) ACTUAL ACTIVITY	(3) ACTIVITY CODE (CHECK ONE)									(4) ROLE CODE IF ACTIVITY CODE 1-5, CHECK					(5) INSTRUCTING STUDENTS?							
																	YES	NO	IF *YES,* ENTER NUMBER BY TYPE					
FROM	TO		1	2	3	4	5	6	7	8	9	1	2	3	4	5			AH	MS	HO	GR	NS	OTH
12:00	6:45	Personal								X														
6:45	7:30	Conduct Ward Rounds with Students		X												X	X			8				
7:30	8:00	Personal (bkft.)								X														
8:00	1:00	Operating Room with Students	X										X				X			2				
1:00	1:30	Personal (lunch)								X														
1:30	3:00	Operating Room with House Staff	X										X				X				2			
3:00	4:00	Reading Medical Journals						X																
4:00	5:30	Attend Grand Rounds			X							X												
5:30	7:00	Teaching Rounds with Students			X										X		X			8				
7:00	9:00	On-Call									X					X								
9:00	10:30	Admit Patient – Emergency	X														X			1	1			
10:30	12:00	On-Call									X													

(see reverse side for codes)

USE FOR COMPLETING COLUMN (3)

GENERAL HOUSE OFFICERS TASKS

1. Patient Care Procedure
2. Work Rounds and Patient Conferences
3. Formal Teaching Rounds and Conferences
4. Informal & Other Teaching, including preparation for teaching
5. Research
6. Independent Learning
7. Administrative
8. Personal
9. Stand-by (at hospital but *not* conducting one of above tasks)

USE FOR COMPLETING COLUMN (4)

GENERAL HOUSE OFFICER ROLES

1. Observer
2. Under Direct Supervision (by Attending Physician or More Senior House Officer)
3. Without Direct Supervision, activity ***REPEATED***
4. Without Direct Supervision, activity ***REVIEWED***
5. Without Direct Supervision, or Review

USE FOR COMPLETING COLUMN (5)

STUDENT CATEGORIES

AH – Allied Health
MS – Medical Student
HO – House Officer
GR – Graduate Student
NS – Nursing Student
OTH – Other

TABLE 59

Incremental Parameters Used to Distribute Joint Activities of House Staff in Nine Sampled Medical Schools, 1972-73

Activities and roles	Teaching responsibility		No teaching responsibility
	Teaching	Learning	Learning
Patient care activity			
Observer	-	1.00	1.00
Under direct supervision	.25	.10	.25
Without direct supervision			
Activity repeated	.25	.05	.15
Activity reviewed	.25	.05	.15
Without direct supervision or review	.35	.05	.15
Work rounds and patient conferences			
Observer	-	1.08	1.00
Under direct supervision	.25	.10	.40
Without direct supervision			
Activity repeated	.35	.10	.20
Activity reviewed	.35	.10	.20
Without direct supervision or review	.40	.05	.15
Formal teaching rounds and conferences			
Observer	-	1.00	1.00
Under direct supervision	.50	.15	.75
Without direct supervision			
Activity repeated	.50	.15	1.00
Activity reviewed	.50	.15	1.00
Without direct supervision or review	.65	.05	1.00

TABLE 60

Summary of House Officer Activities in an Average Workweek for Nine Sampled Medical Schools, 1972-73

School	Average workweek a/	Instruction	Patient care	Research	Learning b/	Administration
1 Hours	58	5	32	1	18	2
%	100%	9%	55%	2%	31%	3%
3	57	7	30	1	18	1
	100%	12%	53%	2%	31%	2%
4	63	8	30	3	20	2
	100%	13%	47%	5%	32%	3%
6	59	7	28	2	20	2
	100%	12%	48%	3%	34%	3%
7	56	7	29	2	16	2
	100%	12%	52%	4%	28%	4%
8	57	4	27	5	20	1
	100%	7%	47%	9%	35%	2%
9	57	7	26	4	19	1
	100%	13%	45%	6%	34%	2%
13	57	9	30	1	15	2
	100%	16%	53%	2%	26%	3%
14	59	6	29	3	19	2
	100%	10%	49%	5%	32%	4%
Average	58	7	29	2	18	2
	100%	12%	49%	4%	31%	4%

a/Does not include stand-by time during which the house officer is not engaged in one of the 5 activity categories. This stand-by time averaged an additional 7.5 hours per week.

b/Includes formal learning (classes and rounds) as well as independent study and preparation.

TABLE 61

Distribution of Average House Staff Salaries in Nine Sampled Medical Schools, 1972-73

School	Total average salaries	Instruction			Patient care[a]	Research[a]
		Total[a]	Medical students[a]	Other students[a]		
1	$ 9,545 100%	$1,195 13%	$ 774 8%	$ 421 5%	$7,968 83%	$ 382 4%
3	$ 9,906 100%	$1,621 16%	$ 926 9%	$ 695 7%	$7,946 80%	$ 333 4%
4	$ 8,840 100%	$1,741 20%	$1,308 15%	$ 433 5%	$6,256 71%	$ 843 9%
6	$11,530 100%	$1,956 17%	$1,232 11%	$ 724 6%	$8,798 76%	$ 776 7%
7	$11,180 100%	$2,294 21%	$1,406 13%	$ 888 8%	$8,203 73%	$ 683 6%
8	$14,590 100%	$1,737 12%	$ 957 7%	$ 780 5%	$10,469 72%	$2,384 16%
9	$10,690 100%	$2,069 19%	$1,180 11%	$ 889 8%	$7,441 70%	$1,180 11%
13	$11,365 100%	$2,601 23%	$1,398 12%	$1,203 11%	$8,527 75%	$ 237 2%
14	$ 9,175 100%	$1,285 14%	$ 642 7%	$ 643 7%	$7,248 79%	$ 642 7%
Average	$10,751 100%	$1,833 17%	$1,091 10%	$ 742 7%	$8,095 75%	$ 829 8%

a/ The dollar amounts were calculated using rounded total average house staff salaries.

time each week. House officers provide 40 percent of the contact that medical students have with their instructors, if all house officers, full-time faculty, and part-time faculty are included.

The contribution of house officers also has a significant impact on education costs per medical student. At the nine sampled medical schools, house officer salaries attributable to medical education averages $900 per student, ranging from $400 to $1,650. The principal factors affecting this wide range of costs are the average house officer salary, the average number of medical students per house officer, and the average percent of time spent in medical student instruction. Table 62 shows these data for each school.

TABLE 62

Major Components of House Officer Costs per Medical Student in Nine Sampled Medical Schools, 1972-73

School	Costs of house officer salaries for the instruction of medical students (per M.D. student)	Average house officer salary	Ratio of medical students per house officer	Average percent of house officer time in medical student instruction
1	$ 750	$ 9,545	0.93	8
3	400	9,900	2.38	9
4	400	8,840	3.13	15
6	950	11,530	1.33	11
7	1,250	11,180	1.12	13
8	1,650	14,590	0.58	7
9	1,200	10,690	1.00	11
13	850	11,365	1.25	12
14	500	9,175	1.25	7
Average	900	10,750	1.44	10

Attachment to Chapter 5

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Chapter 6

OSTEOPATHY

Osteopathic medicine is concerned with the prevention, diagnosis, and treatment of human diseases. The Doctor of Osteopathic Medicine (D.O.) performs surgery, prescribes drugs, and provides other therapies as appropriate. Approximately 90 percent of active osteopathic physicians are primary care physicians; 86 percent are general practitioners and four percent are either internists or pediatricians. The remaining 10 percent are in surgical, psychiatric, or other specialties. About 75 percent of all osteopathic physicians are in private practice.

An historic distinction of osteopathic medicine from the dominant philosophy of medicine is based on the former's emphasis of the interrelationships of the musculo-skeletal, vascular, and nervous systems. The osteopathic physician is trained in manipulative therapy as well as all other medical and surgical techniques.

The practice of osteopathy has changed substantially since World War II, when D.O.s were not eligible for entry into the armed services' medical corps. In 1966, Federal law enacted 10 years earlier was implemented to make osteopathic physicians subject to induction in the medical corps on the same basis as M.D.s. That law and its implementation also accelerated a trend toward changes in state licensing statutes to grant D.O.s a scope of practice similar to that of M.D.s. The professional education of D.O.s had begun to move toward the content of M.D. curricula in 1957, when the accrediting body of the American Osteopathic Association (AOA) instituted many changes in the standards for colleges of osteopathic medicine. The 1965 legislation establishing the Medicare and Medicaid programs furthered the recognition of D.O.s as full medical practitioners by reimbursing them for the same services as provided by M.D.s.

All states and the District of Columbia regulate the practice of osteopathic medicine. Licensure requires graduation from an accredited college of osteopathic medicine, successful completion of a licensing examination, and, in 29 states and the District of Columbia, completion of a one-year internship. Osteopathic physicians now are granted unlimited licensure by all 50 states and the District of Columbia. This licensure allows osteopathic physicians to provide the same range of services as provided by M.D.s. Until recently, many states had licensed osteopaths to conduct only manipulative practices; a few states retain a version of that restriction and grant full licensure only to recent osteopathy graduates.

Osteopathic physicians may have admitting privileges to the 125 osteopathic hospitals across the nation and to about 2,500 allopathic hospitals at the discretion of each hospital's board of trustees.

The Professional Schools

Seven colleges of osteopathic medicine presently are accredited by the AOA to award the degree of D.O. They are listed in Table 63. Six of the colleges are private and freestanding. The one public school is university based. The five schools that are fully developed have enrollments between 330 and 625; enrollments in the two newer schools are about 100 and 150. An additional public freestanding school to be located in Tulsa, Oklahoma, plans to enroll its first class in 1974.

Professional Education

Admission to a school of osteopathic medicine requires at least three years of premedical study at an accredited university or college and successful performance on a standardized Medical College Admission Test. Almost all of the students admitted today as D.O. candidates have a baccalaureate degree.

The curriculum in schools of osteopathy is usually four years in length. Two colleges, however, have recently adopted three-year programs, based on an interdisciplinary approach to the organ systems.

In the colleges with four-year curricula, the first two years emphasize the basic sciences--including such courses as anatomy, physiology, biochemistry, pathology, microbiology, and pharmacology. D.O. candidates also receive instruction in osteopathic principles and practice, which accounts for 3 to 5 percent of the four-year total curriculum. The first two years of study consist mainly of lectures, conferences, individual study, and laboratory work. Clinical clerkships in the third and fourth years provide the bulk of training in the clinical sciences, although some clinical training begins in the second year.

Each college operates one or more outpatient clinics, with daily patient census ranging from about 150 to 250 patients. Six of the colleges also operate one or more teaching hospitals, with inpatient capacities ranging from about 50 to 300 beds, and all are affiliated with other osteopathic and non-osteopathic hospitals. Students also receive general practice training through supervised preceptorships.

All graduates are required to complete an internship approved by the AOA. Usually this is a one-year rotating internship with primary emphasis on medicine, obstetrics and gynecology, and surgery. About 50 percent of all graduates enter residency programs and 10 percent of all graduates enter fellowship programs following their residencies. Currently, about 400 D.O.s are enrolled in residency programs and 200 in fellowship programs. Sixty-five osteopathic hospitals provide internships and/or residencies.

Since 1968, internships and residencies approved by the American Medical Association (AMA) are available to qualified graduates of osteopathic schools. Enrollment in AMA-approved residencies was 236 in 1971, about double the enrollment in 1970. Thirteen AMA-approved examining boards will permit D.O.s to sit for their certifying examination.

TABLE 63

Ownership and Institutional Setting of Colleges of Osteopathic Medicine, 1972-73

School	Ownership	Institutional setting
Chicago College of Osteopathic Medicine, Chicago	Private	Freestanding
College of Osteopathic Medicine and Surgery, Des Moines, Iowa	Private	Freestanding
Kansas City College of Osteopathic Medicine, Kansas City, Missouri	Private	Freestanding
Kirksville College of Osteopathic Medicine, Kirksville, Missouri	Private	Freestanding
Michigan State University College of Osteopathic Medicine, Lansing, Michigan	Public	University
Philadelphia College of Osteopathic Medicine, Philadelphia	Private	Freestanding
Texas College of Osteopathic Medicine, Fort Worth, Texas	Private	Freestanding

Programs leading to a Master of Science degree also are offered by some of the colleges, and all colleges of osteopathic medicine sponsor programs of continuing education. For the seven colleges, sponsored research expenditures totaled $366,344 in Fiscal Year (FY) 1973, only 0.6 percent of aggregate expenditures. Federally funded research comprised 40 percent of total sponsored research; the remainder was funded from private organizations. Non-sponsored research probably does not greatly exceed sponsored research at these colleges, so total research expenditures represent less than 2 percent of total expenditures.

Distribution of Doctors of Osteopathic Medicine

The AOA estimated that on December 31, 1972, there were 14,021 licensed osteopathic physicians, active and inactive. Most osteopathic physicians practice in urban areas in heavily populated states. In 1972, ten states accounted for 72 percent of all osteopathic physicians.

The Sample of Schools

The three colleges of osteopathic medicine that were selected for study reflect the diversity in geographic location, enrollment, and program characteristics of all the schools. The sample of three represents 43 percent of all schools in the profession. Table 64 compares the sample and the total number of schools for three key characteristics.

Costs of Education*

Education costs per student range from $6,889 to $12,338. The average cost of education is $8,966. A summary of education costs per student for the three schools of osteopathy is shown in Table 65.

Because the curricula of medical and osteopathic medical colleges are similar, the methodology used to estimate education costs for colleges of osteopathic medicine corresponds to the methodology used for medicine.** The major difference in curricula is that schools of osteopathy require from 300 to 500 hours of osteopathic principles and practice, resulting in the average length of curriculum at osteopathic colleges being greater than that at medical schools. This difference in the curriculum does not appear to warrant different computational guidelines.

Like medicine, the allocation of faculty costs to education and other programs was based on the analysis of faculty activities

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*Unless otherwise specified, all costs presented in the remainder of this chapter are annual costs.

**Chapter 5 outlines the methodology used for both medicine and osteopathy. A detailed explanation of methodology is presented in Part III.

TABLE 64

Comparison of Schools in the Sample to Total
Number of Osteopathy Schools, 1972-73

Key variables	Sampled schools	Total
Organizational relationship		
Public	0	1
Private	3	6
Institutional setting		
Freestanding	3	6
University or health science center	0	1
Size of D.O. enrollment		
Less than 400	1	3
More than 400	2	4

TABLE 65

Average and Actual Education
Cost per Osteopathy Student, by Components of Cost, 1972-73

Components of cost	Average costs	Actual costs		
		School 1	School 2	School 3
Total education costs	$8,966	$7,673	$12,338	$6,889
Instruction costs	6,560	5,453	8,789	5,437
Faculty costs	2,250	1,405	3,490	1,852
Other direct costs	1,175	1,040	1,793	693
Indirect costs	2,484	2,343	2,626	2,484
Depreciation costs	651	665	880	408
Research associated with education	376	347	536	246
Patient care associated with education	2,030	1,873	3,013	1,206

recorded during one week in the spring of 1973. A distribution of the full-time faculty hours by activity for the three sampled schools appears in Table 66. There is a 24 percent variation in total faculty workweek, which averages 45 hours. Most of this difference is because faculty in School 2 spend 50 percent more time in joint teaching and patient care than the sample average.

With one exception, all of the sampled schools use volunteer faculty only in the clinical sciences program. However, none of the sampled schools use volunteer faculty extensively; the range is 3.9 to 5.5 full-time equivalents (FTEs), and the average is 4.7 FTEs, or about 7 percent of total FTEs. Schools report that generally volunteers have qualifications equivalent to those of associate professors. At an average salary of $30,000, a typical clinical associate faculty member's salary, the average imputed cost of volunteers for each college is $141,000. These faculty primarily engage in joint teaching and patient care activities. Using the average parameter of 45 percent allocated to teaching results in adding $63,450 to the costs of education for each college. For a college of 400 first degree students, this equals about $159 per student, or about 2 percent of the average education costs in the sampled schools.

Other resources used by the schools for which they incur no cash costs are use of facilities and staff at affiliated hospitals, clinics, and other institutions. Although no costs were imputed for these resources, the cash value of the resources would be significant. The colleges all supplement their own clinical teaching facilities through affiliations with health care institutions. Affiliated institutions located throughout the United States include a range of primary health care providers: county and city health departments, drug addiction treatment programs, crippled children's programs, and the departments of community medicine at several public universities.

The methodology for assigning faculty costs to programs was identical to the methodology used in medicine. Table 67 shows the average percent distribution of faculty time by program for each school and the average for the sampled schools. This includes both full-time and part-time faculty. The percent of time spent in the instruction of candidates for the first professional degree ranges from 55 to 66 percent, and the percent of time spent in patient care ranges from 25 to 30 percent. Very little time is spent in research activities at any school. It can therefore be concluded that instruction of first degree students is the primary faculty activity at the sampled schools.

Sources of Variation in Education Costs

The major reasons for variation in education costs of schools of osteopathy are differences in faculty compensation and in patient care costs associated with education. School 2, the highest-cost school, has the highest faculty compensation and the highest number of faculty per osteopathy student.

Variation among schools in the faculty costs of instructing candidates for the first degree are explained by differences in levels

TABLE 66

Average Hours per Week of Full-Time Faculty, by Activity, in Sampled Osteopathy Schools, 1972-73

Activity	Average	School 1	School 2	School 2
Total a/	45	44	51	40
Teaching activities				
Teaching	5	5	5	4
Preparation	10	11	10	8
Curriculum development	3	3	4	3
Joint activities				
Joint teaching and patient care	12	8	18	11
Joint research and teaching	b/	1	b/	b/
Research activities				
Independent research	2	2	2	1
Patient care activities				
Patient care	3	3	4	2
Hospital/clinic administration	1	1	1	b/
Service activities				
Service	1	2	1	b/
General support activities				
Administration	4	3	3	6
Professional development	4	5	3	3
Writing	b/	1	b/	b/

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a/Numbers may not add to totals due to rounding of component numbers to the nearest hour.

b/Less than 30 minutes.

TABLE 67

Distribution of Faculty Time, by Instructional Activities and Programs in Sampled Osteopathy Schools, 1972-73

School	Total	Instruction of first degree students							Other instruction	Research	Patient care
		Teaching	Joint teaching/ patient care	Preparation	Curriculum development	Joint research/ teaching	Other a/	Total			
1	100%	14%	11%	20%	4%	1%	15%	65%	7%	3%	25%
2	100%	10	11	18	7	b/	9	55	10	5	30
3	100%	13	11	19	7	0	16	66	4	3	27
Average		12	11	19	6	b/	13	62	7	4	27

NOTE: Includes both full-time and part-time faculty.

a/Administration, professional development, writing, and service allocated to first degree instruction.
b/Less than 0.5 percent.

of faculty compensation* and in the instructional faculty/student ratio,** which measures the amount of faculty resources devoted to the instruction of first degree students.

Faculty compensation averages $21,445, ranging from $14,908 to $30,670; it tends to be lower at schools that use larger numbers of part-time faculty, since part-time faculty are generally paid at a lower rate.

The instructional faculty/student ratio in the sampled schools ranges from 1 faculty member for every 10 students to 1 for every 14 students.

The effect of faculty costs on instruction costs can be measured by recomputing instruction costs for each school, holding one, and then both, faculty cost factors constant at the average level for all schools. The extent to which each of these factors account for variation in instruction costs can then be measured by changes in the range of instruction costs.

Table 68 shows the cost for each factor and the recomputed ranges in instruction costs.

The actual range in instruction costs is $3,352. The following changes in the range were obtained by using average costs:

- Holding faculty compensation constant at the average level decreases the range in instruction costs by 40 percent. This is because the school with the highest instruction costs, School 2, has average salaries almost twice as high as in the other two schools; total compensation is also much higher, as a result of private patient income. Substituting the overall average increases instruction costs for Schools 1 and 3, and decreases them for the higher-cost school, thereby reducing the range

- The range in instruction costs is reduced 23 percent by holding the instructional faculty/student ratio constant at the average level. Substituting the average ratio raises the costs of the low-cost schools and lowers the cost of the high-cost schools, thus reducing the range

- Holding both factors constant at their average levels is equivalent to substituting the average faculty costs per student, $2,250, at each school; this reduces the range by 60 percent.

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*Average faculty compensation is shown on an FTE basis. Faculty compensation is computed by dividing total faculty compensation costs by the number of FTE faculty at each school.

**Instructional faculty/student ratio is computed by dividing the number of faculty by the number of first degree students and multiplying the result by the average percent of time spent by faculty in the instruction of these students.

TABLE 68

Variation in Range of Instruction Costs per Osteopathy Student Due to Differences in Faculty Costs, 1972-73

Source of change	Range	Percent reduction
Range of the sampled schools	$3,352	NA
Range computed by substituting average faculty salary of $21,445 a/	2,003	40
Range computed by substituting average instructional faculty/student ratio of one faculty for every 13 students b/	2,576	23
Range computed by substituting average faculty salary and average instructional faculty/student ratio	1,332	60

a/Actual range in faculty salaries is $14,908 to $30,670.
b/Instructional faculty/student ratios range from one faculty member for every 10 students to one for every 14 students.

Thus faculty costs are an important source of variation in instruction costs per student, and differences in faculty compensation are the major reason for cost variation in the three schools of osteopathy.

The difference in average faculty salaries is most pronounced in the clinical sciences. In each of the schools, average clinical salaries are almost twice as high as average basic sciences salaries. Accordingly, the higher the proportion of FTE faculty in the clinical sciences, the higher are total faculty costs. This situation prevails in School 2, which has the highest proportion of FTE faculty in the clinical sciences--69 percent compared to 61 percent and 57 percent in Schools 1 and 3.

A review of clinical faculty on a departmental basis for School 2 shows that higher salaries and greater numbers of full-time faculty are not distributed proportionately across all departments. Instead, several departments have more than twice as many full-time faculty than the other schools combined, at salaries about twice the overall average of School 2. The reasons for the heavy commitment to certain departments is not known, but, because of the unevenness across departments, the causes of variation cannot be understood by looking only at school-wide averages.

Variation in instruction costs is also caused by differences in other direct and indirect costs. To determine the effect of these factors on instruction costs, the average cost of each factor is substituted for the actual cost in each school and instruction costs are recomputed. Table 69 shows the results of the analysis:

- The range of costs decreases by 23 percent when average other direct costs per student are substituted for each school, because this reduces costs at School 2, the high-cost school, and increases them at the other two schools

- Substituting average indirect costs per student of $2,484 decreases the range only slightly.

In short, the difference in faculty compensation remains the largest single factor explaining variation in the instruction component of cost.

Variation in education costs is consistent with the variation in instruction costs. School 2 ranks highest in every major component of cost--instruction, research, and patient care.

The research programs in colleges of osteopathic medicine are so small relative to the first degree instructional programs, that in none of the sampled schools did the actual amount of research expenditures approach the parameter of 0.67 of instruction cost in the basic sciences and 0.30 in the clinical sciences. Thus, increasing or decreasing either parameter by 50 percent has no effect on education costs. Faculty salaries allocated to research as a percent of faculty salaries allocated to D.O. instruction range from 1 to 18 percent in the basic sciences and 0 to 4 percent in the clinical sciences departments.

TABLE 69

Variation in Range of Instruction Costs per Osteopathy Student Due to Differences in Non-Faculty Costs, 1972-73

Source of change	Range	Percent reduction
Range of sampled schools	$3,352	NA
Range computed by substituting average amount of other direct costs of $1,175 a/	2,583	23
Range computed by substituting average amount of indirect costs of $2,484 b/	3,210	4

a/Actual range in other direct costs is $693 to $1,793.
b/Actual range in indirect costs is $2,343 to $2,626.

Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

In computing these expenditures for osteopathy schools, research and clinic revenues are apportioned to first degree education and graduate education programs based on the total instruction costs of these programs. Revenues allocated to the education program for first degree students are then deducted from the education program's costs to produce net education expenditures for schools of osteopathy.

Net education expenditures for the three colleges of osteopathy, displayed in Table 70, range from $6,339 to $7,778 per student; the average is $6,979.

School 2, which has the highest education costs, also has the highest net education expenditures. However, the range from the highest to the lowest net education expenditures, $1,439, is $4,010 less than the range in education costs. This reflects School 2's ability to generate a large amount of income for its research and patient care activities.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recommends their use as the basis for setting capitation rates. Table 71 shows the relationship of authorized and actual capitation amounts to net education expenditures for each school of osteopathy.

Table 72 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in osteopathy, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

Sources of Income

Table 73 shows the percent distribution of 1972-73 sources of income for the colleges of osteopathic medicine in the sample. Tuition and patient care income are the largest sources of revenue in all three schools, although School 1 also derives 23 percent of its income from state appropriations. Income from sponsored research comprises less than 1 percent of total income for each college, but income from Federal capitation grants averages 9 percent of total income.

TABLE 70

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Osteopathy Student, in Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Sponsored research	Patient care	
1	$ 7,673	$ 95	$1,239	$6,339
2	12,338	191	4,369	7,778
3	6,889	68	0	6,821
Average	8,966	118	1,869	6,979

TABLE 71

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures, per Osteopathy Student, in Sampled Schools, 1972-73

School	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount a/	Percent	Amount	Percent
1	$6,339	$2,850	45	$ 356 b/	6
2	7,778	2,850	37	1,871	24
3	6,821	2,850	42	1,810	27
Average	6,979	2,850	41	1,346	19

a/A basic capitation amount of $2,850 has been used, rather than the $2,500, to reflect the $4,000 capitation award made for students in the graduating class.

b/School 1 did not qualify for a full year grant in 1972-73.

TABLE 72

Percent of Net Education Expenditures per Osteopathy Student Covered at Different Levels of Capitation in Sampled Schools, 1972-73

School	Net education expenditures per student	Capitation at 25 percent of average net education expenditures ($1,745)	Capitation at 33-1/3 percent of average net education expenditures ($2,324)	Capitation at 40 percent of average net education expenditures ($2,792)
1	$6,339	28%	37%	44%
2	7,778	26	34	41
3	6,821	22	30	36

TABLE 73

Distribution of Income by Source, in Sampled Osteopathy Schools, 1972-73

Income source	School 1	School 2	School 3
Total	100%	100%	100%
Education income	37	11	64
Tuition and fees	9	5	34
Gifts and endowments	a/	1	3
Teaching/training grants	2	1	2
Other institutional support	0	a/	
State general appropriation	23	0	5
Federal capitation	3	5	20
Patient care income	63	86	27
Research income	a/	a/	a/
Other	a/	2	9

a/Less than 0.5 percent.

Summary

The annual per student cost of educating candidates for the D.O. degree ranges from $6,889 to $12,338, with an average of $8,966. The major factor accounting for variation in education costs is the difference in faculty compensation levels among the schools.

Net education expenditures for osteopathic colleges range from $6,339 to $7,778, with an average of $6,979. Net education expenditures are lower than the education costs for each school sampled, reflecting the ability of these institutions to generate income from their research and patient care programs that can be used to cover part of the costs of education.

The currently authorized capitation of $2,850 per student covers 41 percent of the average net education expenditures and the actual average capitation of $1,346 covers 19 percent. Capitation levels of $1,745, $2,324, and $2,792 would be required to cover 25 percent, 33-1/3 percent, and 40 percent, respectively, of average net education expenditures for schools of osteopathy.

Chapter 7

DENTISTRY

The dentist is educated and trained to recognize oral diseases and the oral signs of other diseases, and to restore and maintain the hard and soft oral tissues. Although there is increasing professional activity in prevention of oral disease, therapeutic procedures still occupy most of the practicing dentist's time.

Dental research has contributed to an understanding of the processes of dental caries and periodontal disease, and furthered the prophylactic use of fluorides.

The Professional Schools

Fifty-six schools enrolled students in Doctor of Dental Surgery (D.D.S.) or Doctor of Dental Medicine (D.M.D.) degree programs in 1972-73.* Two additional schools are admitting their first classes in 1973-74. The schools are located in 30 states, Puerto Rico, and the District of Columbia. The pattern of dental school distribution appears to be unrelated to the population density of a region. As Table 74 shows, the densely populated northeast has only 12 dental schools while 37 schools are located in the more sparsely populated states of the midwest and south.

Table 75 displays the average number of students and the range of enrollments for public and private schools for 1972-73. There are 32 public dental schools, 17 private, and 7 that receive some state support, such as subsidies for resident students.

Professional Education

The dental curriculum traditionally is divided into two years of basic science and pre-clinical instruction and two years of supervised patient care in the dental clinic. Basic science instruction, consisting primarily of lectures, laboratories, and seminars, is taught by dental faculty at some schools, while at others it is taught by faculty of the medical school or of a division of basic health sciences. Pre-clinical instruction is designed to develop manual skills before actual clinical experience.

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*Both the D.D.S. and D.M.D. are granted as the first professional degree in dentistry. The two degrees are functionally equivalent; the distinction is due to custom rather than differences in curriculum or instructional content.

TABLE 74

Geographic Distribution of Dental Schools, 1972-73

Region	Number of states	Number of dental schools	Population per square mile
Northeast	9	12	300
North Central	12	16	75
South	16	21	72
West	13	7	20

TABLE 75

Number of Dental Schools and Enrollments by Type of Ownership, 1972-1973

Ownership	Number of schools a/	Enrollments	Average number of D.D.S. students per school b/	Range of enrollments b/
Public	32	9,545	342	162-633
State-related	7	3,014	431	345-535
Private	17	5,817	362	69-720

SOURCE: *The Annual Report on Dental Education,* Council on Dental Education, American Association of Dental Schools, 1972-73.

a/Includes five public schools and one private school "not fully operational."
b/Excludes data on six schools "not fully operational."

Most clinical instruction is conducted in the schools' dental clinics, where students provide patient care under faculty supervision. Because dental students usually enter practice upon completion of the first professional degree, clinical experience and responsibility are crucial to the educational program.

Clinical instruction in recent years has emphasized the employment of dental auxiliary personnel, for whose training there are Federal grants. Dental auxiliaries usually receive their instruction from dental school faculty and work with dental students in the clinics.

Dental Manpower and Distribution

Improvements in techniques and equipment, along with increased use of auxiliary personnel, have expanded the capacity of dental care in the past two decades. The ratio of dentists to population has remained stable since 1950, while the supply of dental auxiliaries expanded, as Table 76 shows. The number of hygienists increased 118 percent, the number of assistants 107 percent, and the number of technicians 108 percent.

Of the 117,920 dentists in the United States in 1971, 103,750 were classified as active practitioners. Approximately 94 percent of these were employed in the non-Federal sector and the remaining six percent in the Federal sector. The non-Federal, active dentists primarily worked in dental care delivery and dental education.

The northeast and far west regions of the nation have the highest ratios of dentists to population while the south and southwest have the lowest. The number of active, non-Federal dentists per 100,000 civilians in 1971 ranged from 69 in New York to 26 in South Carolina. The national average is 47 per 100,000.

The majority of dental graduates enter practice after award of the first professional degree. There is a trend, however, toward more specialization. Since 1960, the number of specialists more than doubled, to account for almost 9 percent of all dentists by 1970. Orthodontists and oral surgeons constitute the majority of dental specialists. Table 77 displays the number of dentists by specialty.

Numbers of dental graduates have increased steadily over the past twenty years. Between 1950 and 1970, 16 new dental schools were established and two ceased operation. Enrollments during that period grew by 60 percent. The majority of the new schools are in states with large rural populations and lower than average ratios of dentists to population. All but three of the new schools are public institutions, and 10 are in states that previously had no dental school.

The newest schools have not reached capacity enrollment and their eventual effect on total numbers of graduates is not complete. Nonetheless, between academic years 1971-72 and 1972-73, first-year enrollment in dental schools rose from 4,745 to 5,337 students, an increase of 12.5 percent. By 1972-73, there were 18,376 candidates for the D.D.S. or D.M.D. degree in 56 dental schools.

TABLE 76

Number of Dentists and Dental Auxiliaries, for Selected Years, 1950-1971

Type of manpower	Year		
	1950	1960	1971
Active, non-federal dentists	75,310	84,500	97,210
Per 100,000 civilians	49.9	47.0	47.3
Dental hygienists	7,700	13,000	16,800
Dental assistants	55,000	83,000	114,000
Dental technicians	15,000	24,000	31,150

SOURCE: National Center for Health Statistics, *Health Resources Statistics: Health Manpower and Health Facilities, 1972-73,* DHEW Pub. No. (HSM) 73-1509, pp. 91-129.

TABLE 77

Distribution of Dentists by Specialty, for Selected Years, 1955-70

Specialty	1955	1960	1965	1970
Total	3,034	4,170	6,462	10,315
Endodontists	a/	a/	a/	a/
Oral pathologists	24	42	52	97
Oral surgeons	844	1,183	1,636	2,406
Orthodontists	1,521	2,097	3,437	4,335
Pedodontists	148	229	568	1,159
Periodontists	245	307	376	1,003
Prosthodontists	225	278	336	715
Public health dentists	27	34	57	103
Specialists as a percent of total dentists		4.1%		8.9%

SOURCE: NCHS, *Health Resources Statistics: Health Manpower and Health Facilities, 1972-73,* DHEW Pub. No. (HSM) 73-1509, p. 96.

a/Data unavailable, not recognized as a specialty.

The Sample of Schools

In order to pick a representative sample of dental schools, the statistical techniques of factor analysis and clustering were used to group dental schools with similar characteristics.* In general, the school most representative of the cluster was included in the sample. Table 78 displays the summary characteristics of the eight dental schools in the sample with respect to the universe of schools; they represent 16 percent of all fully operational dental schools in 1972-73. Five of the schools are public including one state-related school, and three are private; seven of the eight schools are based in health science centers.

Enrollments of candidates for the first professional degree in the sample range from 215 to 623. Each of the sampled schools has a post-doctoral program, with between 22 and 64 students enrolled, and each is either totally or partially responsible for instructing dental allied health students.

Full-time and part-time faculty resources also vary greatly among the sample of dental schools. The average number of full-time and part-time faculty is 70 and 133, respectively, and the ratio of the full-time to part-time faculty ranges from 0.21 to 1.7.

In several of the sampled schools, some or all basic science instruction is provided to dental students by the faculty of the medical school or the school of basic health sciences.

On the average, the sampled schools have 4.2 dental students per total full-time equivalent (FTE) faculty and 5.2 dental students per clinical FTE faculty. The school with the lowest ratio of students to total FTE faculty has fewer than three dental students per FTE faculty. The school with the highest ratio has more than six dental students per FTE faculty. Table 79 shows the characteristics of the sampled schools.

Costs of Education**

Education costs per student range from $6,132 to $16,000. The average cost of education is $9,059. A summary of education costs per student for the eight dental schools is shown in Table 80.

Education costs at the three private schools average $7,289 per student, 28 percent lower than the $10,122 per student at the five public schools. Overall, education costs per student do not vary greatly except for the two high cost schools.

Average instruction costs are 88 percent of education cost per dental student; they range from $5,752 to $14,198, and average of $8,008. Six of the eight sampled schools cluster within a range

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*A detailed discussion of these techniques appears in Part III.

**Unless otherwise specified, all costs presented in the remainder of this chapter are annual costs.

TABLE 78

Comparison of Schools in the Sample to Total Number of Dental Schools, 1972-73

Key variables	Sampled schools	Total
Organizational relationship		
Public	5	39 [a]
Private	3	17
Institutional settings		
University	1	6
Health science center	7	50
Size of D.D.S. Enrollment		
Less than 400	4	36
More than 400	4	20
Geographic distribution		
Northeast	3	12
North Central	1	16
South	2	21
West	2	7

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[a] Includes seven state-related schools.

TABLE 79

Characteristics of the Sampled Dental Schools, 1972-73

Characteristics	Average	Range
Enrollment		
D.D.S.	430	215-623
Post-doctoral	45	22-64
Allied health	96	a/-163
Faculty		
Full-time	70	48-82
Part-time	133	42-347
FTE	92	56-108
Students per faculty		
D.D.S. students per FTE faculty	4.2	2.3-6.3
D.D.S. students per clinical FTE faculty	5.2	2.5-6.7
Total students per FTE faculty a/	5.6	2.7-8.5

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a/Each of the sampled schools instructed dental allied health students. At several schools these students are enrolled in separate schools of allied health sciences or other colleges within the university system.

TABLE 80

Average and Actual Education Costs per Dental Student, by Components of Cost, 1972-73

Components of cost	Average costs	Actual costs							
		School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8
Total education costs	$9,059	$7,081	$6,802	$14,139	$6,586	$16,000	$7,674	$8,060	$6,132
Instruction costs a/	8,008	6,279	6,218	11,514	5,923	14,198	7,084	7,092	5,752
Faculty costs	2,918	3,018	2,176	3,360	2,074	5,414	2,638	2,136	2,524
Other direct costs	2,275	1,505	2,816	2,105	852	5,068	2,985	1,262	1,610
Indirect costs	2,259	1,636	891	4,858	2,835	2,836	1,258	2,597	1,162
Depreciation costs	138	80	79	103	111	201	203	121	206
Cross subsidization	418	40	256	1,088	51	679	0	976	250
Research associated with education	1,052	802	584	2,625	663	1,802	590	968	380

a/Clinic costs are included in each of the components of instruction costs.

of $1,350 per student; the remaining two schools have significantly higher costs.

The general methodology used for estimating costs of education in all professions is described in detail in Part III. The methodology for dental schools reflects the particular relationships among their education, patient care, and research programs:

- Patient care takes place mainly in dental clinics owned by the schools, and is performed primarily by students, under faculty supervision. Since these clinics are operated principally for education, their operating costs are included in instruction costs

- The constructed cost seminar for dental education determined that for each hour spent in D.D.S. instruction a basic science faculty member requires 0.67 hours in research, and a clinical faculty member requires 0.10 hours in research. A detailed analysis of the impact of these judgments on costs is presented later in this chapter and a description of the constructed cost seminar process and results is presented in Part III

- Each sampled school educates graduate and dental allied health students. The dental clinic supports graduate and allied health education as well as education of dental students. Therefore, clinic expenses are allocated to dental students, graduate students, and dental allied health students on the basis of total non-clinic instruction costs for the three types of students.

The allocation of faculty costs among dental education and other programs is based on an analysis of faculty activities recorded during one week in the spring of 1973. Dental school faculty kept logs of their activities, then categorized each activity by using one of 13 activity categories defined in Chapter 3, Table 12. A summary of the average and range of full-time faculty hours by activity for the sampled dental schools appears in Table 81. The average faculty workweek is 49 hours, ranging from 44 to 54 hours. The variation in average weekly hours is due in part to the various definitions of full-time faculty at the schools. For example, some schools define a four-day workweek for full-time faculty while others follow a five-day week.

The following rules were used to allocate faculty costs among programs for each dental school:

- 100 percent of the faculty costs of joint teaching and patient care activities with dental students is allocated to the instruction of first degree students

- 100 percent of the faculty costs of joint research and teaching with dental students is allocated to first degree student instruction.

TABLE 81

Average and Range of Hours per Week of Full-Time Faculty, by Activity in Sampled Dental Schools, 1972-73

Activity	Average	Range
Total	49	44-54
Teaching activities		
Teaching	6	5-12
Preparation	8	6-12
Curriculum development	4	2-5
Joint activities		
Joint teaching and patient care	9	2-13
Joint research and teaching	1	0-2
Research activities		
Independent research	5	2-8
Patient care activities		
Patient care	2	1-4
Hospital/clinic administration	a/	0-1
General support activities		
Administration	5	3-8
Service	2	1-3
Professional development	6	2-8
Professional writing	1	1-2

a/Less than 30 minutes.

- Faculty and clinic costs associated with patient care activities are allocated to instruction of first degree students and other students based on total non-clinic costs for each type of student

- General support activities--administration, service, professional development, and writing--are allocated to programs in proportion to the time assigned to each program for all other activities.

Table 82 shows the average percent distribution of faculty time by program for each school and the average for the sample of dental schools. This distribution includes both full-time and part-time faculty. The data show that instruction of first degree students is the principal program at the sampled dental schools accounting for 55 to 79 percent of faculty time. About half of this time is spent in first degree student contact activities. Education of other students averages 25 percent of faculty time, ranging from 17 to 36 percent. There is a wide range of faculty time spent, 4 to 21 percent, in research; on the average, however, research accounts for 10 percent of faculty time.

Sources of Variation in Education Costs

The major reasons for variation in education costs in schools of dentistry are:

- Faculty costs per student--differences in these costs are principally related to the faculty/student ratios in the schools than to average faculty salaries

- Other direct costs per student, including support staff salaries and other operating expenses. In general, as faculty costs per student increase, other direct costs per student also increase

- Research costs per student, a function of the total amount spent for research in each school.

Variation in faculty costs per student is explained by differences in the instructional faculty/student ratio,* which measures the amount of faculty resources devoted to first degree instruction. Full-time faculty salaries range from $19,700 to $24,468 with an average of $21,967. The instructional faculty/student ratio at the eight dental schools ranges from one faculty member for every three students to one for every nine students. Clinical faculty account for 75 percent of the total faculty at the sampled schools; they also account for the large variation in the instructional faculty/student ratio.

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*Instructional faculty/student ratio is computed by dividing the number of faculty by the number of first degree students and multiplying the result by the average percent of faculty time spent in the instruction of these students.

TABLE 82

Distribution of Faculty Time, by Instructional Activities and Programs in Sampled Dental Schools, 1972-73

School	Total	Instruction of first degree students								Other instruction	Research
		Teaching	Joint teaching and patient care	Preparation	Curriculum development	Joint research and teaching	Patient care	Other a/	Total		
1	100%	8%	20%	8%	5%	b/	4%	11%	56%	23%	21%
2	100	10	33	11	7	b/	2	16	79	17	4
3	100	7	23	10	4	1	5	15	65	20	15
4	100	8	15	11	4	-	6	11	55	36	9
5	100	7	16	9	8	1	4	26	71	24	5
6	100	10	20	8	3	b/	2	15	58	33	9
7	100	22	8	8	6	b/	5	10	59	31	10
8	100	10	29	13	4	-	3	16	75	18	7
Average	100	10	21	10	5	b/	4	15	65	25	10

NOTE: Includes both full-time and part-time faculty.

a/Administration, professional development, and writing allocated to first degree instruction.
b/Less than one percent.

The effect of faculty costs on instruction costs can be measured by recomputing instruction costs for each school, holding one, and then both, faculty cost components constant at the average level for all schools. The extent to which each of these factors account for the variation in instruction costs can then be measured by changes in the standard deviation* of instruction costs.

Table 83 shows that variation in the instructional faculty/student ratio accounts for virtually all of the variation in faculty costs. Differences in average full-time faculty salaries appear to have no effect on cost variation.

In several of the health science center-based sampled schools most basic science instruction is taught by faculty of medical schools or other health professional schools. Although costs at these schools contain large amounts for instruction provided by other schools, there is no corresponding reduction in these dental schools' faculty costs per student.

Variation in other direct and indirect costs is influenced mainly by the distribution of faculty costs. In general, schools with high faculty costs per student have high other direct costs. To determine the impact of these factors on instruction costs, the average level of each factor is substituted for the actual level in each school, and instruction costs are recomputed. Table 84 shows that 26 percent and 20 percent of the variation in instruction costs is explained by variation in other direct costs and indirect costs respectively.

Indirect costs per student vary according to the institutional setting of the dental school; for example, schools located in health science centers tend to have higher indirect costs due to high administrative costs.

Variation in education costs not explained by variation in instruction costs is attributable to differences in the research component of education costs. This component of education costs varies directly with availability of research revenues. The research component of education costs ranges from $380 to $2,625 per dental student, with an average cost of $1,052.

Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

In computing these expenditures for dental schools, research and clinic revenues are apportioned to first degree education and

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*The standard deviation was chosen for variation analysis because, given the distribution of per student costs, it is a measure of dispersion that is not unduly affected by extreme cases in the data.

TABLE 83

Variation in the Standard Deviation of Instruction Costs per Dental Student Due to Differences in Faculty Costs, 1972-73

Source of Change	Standard deviation	Percent reduction
Standard deviation of sampled schools	$3,121	NA
Standard deviation computed by substituting average faculty salary of $21,967 a/	3,092	1
Standard deviation computed by substituting average instructional faculty/student ratio of one faculty for every seven students b/	2,112	32
Standard deviation computed by substituting average faculty salary and instructional faculty/student ratio	2,061	34

a/Actual range in faculty salaries is $19,700 to $24,468.

b/Instructional faculty/student ratios range from one faculty member for every three to one for every nine students.

TABLE 84

Variation in the Standard Deviation of Instruction Costs per Dental Student Due to Differences in Non-Faculty Costs, 1972-73

Source of change	Standard deviation	Percent reduction
Standard deviation of sampled schools	$3,121	NA
Standard deviation computed by substituting average amount of other direct costs of $2,275 a/	2,306	26
Standard deviation computed by substituting average amount of indirect costs of $2,259 b/	2,503	20

a/Actual range in other direct costs is $852 to $5,068.
b/Actual range in indirect costs is $891 to $4,858.

graduate education programs based on the total instruction costs of these programs. Revenues allocated to the education program for first degree students are then deducted from the education program's costs to produce net education expenditures for schools of dentistry.

Net education expenditures for the eight dental schools, displayed in Table 85 range from $5,054 to $13,397 per student; the average is $7,406.

The relative ranking of the schools according to net education expenditures is almost the same as their relative positions according to education costs, with only two minor exceptions--Schools 4 and 8 with the second lowest and lowest education costs respectively have the lowest and almost identical net education expenditures.

Variation in the research and patient care income offsets to education costs reflects each school's ability to generate revenues for these activities. Research revenues are primarily a function of the size of the research program; while patient care revenues seem to vary with the number of clinic chairs: the greater the number of clinic chairs, the higher patient care or clinic revenue.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recommends their use as the basis for setting capitation rates. Table 86 shows the relationship of authorized and actual capitation amounts to net education expenditures for each dental school in the sample. Authorized capitation for 1972-73, of $2,850 per student covers 21 to 56 percent of net education expenditures. Actual capitation payments are approximately 70 percent of the authorized level in 1972-73, covering 15 to 38 percent of net education expenditures.

Table 87 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

Sources of Income for Dental Schools

Table 88 shows the percent distribution of 1972-73 sources of income for each of the sampled schools. Education income accounts for 62 to 87 percent of total income. Income from tuition and fees is significantly higher in the private schools than in state schools. In several cases, tuition and clinic revenues are collected by the state or parent university, not the dental school. Clinic revenues vary from 6 to 19 percent of total revenues and research ranges from 5 to 30 percent, reflecting the schools' relative reliance on these sources of income.

TABLE 85

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Dental Student, in Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Sponsored research	Patient care	
1	$ 7,081	$ 356	$1,023	$ 5,702
2	6,802	584	712	5,506
3	14,139	1,345	700	12,094
4	6,586	573	959	5,054
5	16,000	1,688	915	13,397
6	7,674	301	1,457	5,916
7	8,060	891	642	6,527
8	6,132	0	1,077	5,055
Average	9,059	717	936	7,406
Range	6,132-16,00	0-1,688	642-1,457	5,054-13,397

TABLE 86

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Dental Student, in Sampled Schools, 1972-73

School	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
1	$ 5,702	$2,850	50	$ 0	0
2	5,506	2,850	52	2,009	36
3	12,094	2,850	24	1,840	15
4	5,054	2,850	56	1,918	38
5	13,397	2,850	21	2,120	16
6	5,916	2,850	48	2,114	36
7	6,527	2,850	44	2,055	31
8	5,055	2,850	56	1,818	36
Average	7,406	2,850	38	1,982[a]	27[a]
Range	5,054-13,397		21-56	1,818-2,120	15-38

a/Excludes School 1.

TABLE 87

Percent of Net Education Expenditures per Dental Student Covered at Different Levels of Capitation in Sampled Schools, 1972-73

School	Net education expenditures per student	Capitation at 25 percent of average net education expenditures ($1,852)	Capitation at 33 1/3 percent of average net education expenditures ($2,466)	Capitation at 40 percent of average net education expenditures ($2,962)
1	$ 5,702	32%	43%	52%
2	5,506	34	45	54
3	12,094	15	20	24
4	5,054	37	49	59
5	13,397	14	18	22
6	5,916	31	42	50
7	6,572	28	38	45
8	5,055	37	49	59

TABLE 88

Distribution of Income by Source, in Sampled Dental Schools, 1972-73

Income Source	Public Schools					Private Schools		
	1	2	3	4	5	6	7	8
Total	100%	100%	100%	100%	100%	100%	100%	100%
Education income	74	86	82	73	87	71	62	76
Tuition and fees	8	11	12	18	7	37	37	33
Gifts and endowments	0	0a/	1	3	1	2	1	5
Teaching/training grants	6	5	5	8	10	9	5	8
Other institutional support	5	2	4	3	4	7	0	7
State general appropriation	55	47	47	16b/	54	0	1	0
Federal capitation	0	21	13	25	11	16	18	23
Patient care income	13	9	6	19	6	17	8	16
Research income	13	5	12	8	7	10	30	8
Other non-education income	0	a/	a/	0	0	2	0	0
General university support	0	0	0	0	0	0	0	0

a/Less than 0.5 percent.
b/Estimated.

Effect of Changes in Research Essential to Education

The judgments used in this study regarding research essential to education represent the consensus of a group of dental educators and administrators. To measure the effect of variation in these judgments on education costs and net education expenditures, a 50 percent increase and a 50 percent decrease was computed for each school in the sample.

Tables 89 and 90 show that while education costs change slightly, there is a change, on the average, of less than 1 percent in net education expenditures. The changes in net education expenditures occur when research revenues are so low that they are not sufficient to cover even the research not included in education.

Summary

The annual per student cost of educating candidates for the D.D.S. (D.M.D.) degree ranges from $6,132 to $16,000; the average is $9,059. The public schools in the sample have higher average costs per student than the private schools.

Average net education expenditures per student for the sampled dental schools are $7,406. These are $1,650 below average education costs, reflecting the ability of the schools to obtain funding from research and patient care buyers to cover part of education costs. The currently authorized capitation of $2,850 per student represents 38 percent of the average net education expenditures, and the actual average capitation of $1,982 covers 27 percent.

Capitation amounts per student of $1,852, $2,466, and $2,962 would be required to cover 25 percent, 33-1/3 percent, and 40 percent respectively of average net education expenditures for dental schools.

TABLE 89

Percent Change in Education Costs and Net Education Expenditures per Dental Student From a 50 percent Increase in Research Essential to Education, 1972-73

School	Basic science research		Clinical science research		Basic and clinical sciences research	
	Education costs	Net education expenditures	Education costs	Net education expenditures	Education costs	Net education expenditures
1	2%	2%	4%	0%	6%	0%
2	1	0	a/	0	1	0
3	3	0	6	0	9	0
4	2	0	3	0	5	0
5	1	0	a/	0	2	0
6	2	0	2	0	4	0
7	3	0	3	0	6	0
8	2	2	1	2	3	4
Average	2	a/	2	a/	4	a/
Range	1-3	0-2	8-6	0-2	1-9	0-4

a/Less than 1 percent.

TABLE 90

Percent Change in Education Costs and Net Education Expenditures per Dental Student From a 50 Percent Decrease in Research Essential to Education, 1972-73

School	Basic science research		Clinical science research		Basic and clinical sciences research	
	Education costs	Net education expenditures	Education costs	Net education expenditures	Education costs	Net education expenditures
1	2%	0%	4%	0%	6%	1%
2	2	0	3	0	4	0
3	3	0	6	0	9	0
4	2	0	3	0	5	0
5	1	0	4	0	6	0
6	2	0	2	0	4	0
7	3	0	3	0	6	0
8	2	2	1	2	3	4
Average	2	a/	3	a/	5	a/
Range	1-3	0-2	1-6	0-2	3-9	0-4

a/Less than 1 percent.

Chapter 8

OPTOMETRY

The Doctor of Optometry (O.D.) is a health professional who performs eye examinations to determine the presence of visual, muscular, or neurological abnormalities, and prescribes lenses, other optical aids, or therapy such as eye exercises to enable maximum vision. Optometrists are trained to recognize diseased conditions of the eye and ocular manifestations of other diseases, and to refer patients with these conditions to the appropriate health professional.

A 1968 survey by the National Center for Health Statistics (NCHS) showed that about 94 percent of the 18,427 active optometrists were self-employed, or employed by other optometrists, ophthalmologists, or other physicians. Most of the remainder were employed by government, industry, or non-profit organizations. A 1972 study found about one-third of optometrists practicing in communities of less than 20,000 population.

Optometry education in its present form, the six-year program of general and professional education leading to the O.D. degree, began in 1955. Until the late nineteenth century, optometry education was by apprenticeship. By 1900 there were more than 60 proprietary training schools for optometrists in the United States. The first university course in optometry, a two-year program, was offered at Columbia University in 1910, and three other university programs were established in the next fifteen years. The development of accreditation standards caused most of the proprietary schools to close, although a few of them survived as private non-profit institutions, the free-standing colleges of today.

Most of the university programs in optometry began as part of the physics department. Over time, however, the emphasis in optometry shifted toward the physiological aspects of vision and the programs became distinct from physical optics. Adding clinical experience to the curriculum lengthened the programs until the current four-year professional training became the standard.

The Professional Schools

Education of optometrists in the United States is provided by the twelve colleges of optometry shown in Table 91. Seven of the twelve are affiliated with universities or health science centers and five are freestanding. Each offers a four-year professional program leading to the O.D. degree and five of the university-based schools offer master's or doctoral degrees, or both.

TABLE 91

Ownership and Institutional Setting of Colleges of Optometry, 1972-73

School	Ownership	Institutional setting
University of Alabama, School of Optometry, Birmingham	Public	Health science center
University of California, School of Optometry, Berkeley	Public	University
University of Houston, College of Optometry, Houston	Public	University
Indiana University, Division of Optometry, Bloomington	Public	University
Ohio State University, College of Optometry, Columbus	Public	Health science center
State University of New York, School of Optometry, New York City	Public	University [a]
Pacific University College of Optometry, Forest Grove, Oregon	Private	University
Illinois College of Optometry, Chicago	Private	Freestanding
Massachusetts College of Optometry, Boston	Private	Freestanding
Pennsylvania College of Optometry, Philadelphia	Private	Freestanding
Southern California College of Optometry, Fullerton	Private	Freestanding
Southern College of Optometry, Memphis	Private	Freestanding

SOURCE: Robert Havighurst, *Optometry: Education for the Profession*, National Commission on Accrediting, 1973.

[a] Although this school is a part of the State University of New York system, it is not located on a university campus, and is functionally independent.

Seven of the twelve colleges of optometry have enrollments of 200 to 275 students in their first degree programs. Two relatively new schools, the University of Alabama and the State University of New York, have only a few students. The largest schools, Illinois College of Optometry, Pennsylvania College of Optometry, and Southern College of Optometry, each have enrollments of about 500 students. Enrollments of first degree students in all optometry schools totaled about 3,300 in 1972-73.

Professional Education

Admission to a school of optometry requires at least two years of prior college training, including courses in biology, chemistry, physics, mathematics, humanities, and social sciences. Of students entering optometry in 1972, 62 percent had three years of college, 44 percent had bachelor's degrees, and three percent had master's degrees.

The professional curriculum leading to the O.D. requires four years of study, including physics, biochemistry, physiology, microbiology, pharmacology, pathology, visual sciences, and clinical experience. Visual science includes such subjects as binocular vision, history of optometry, ophthalmic optics, refraction, space perception, and practice management.

Clinical training of optometry students is conducted in facilities owned and operated by the schools and in affiliated clinics. The clinics are an integral part of the teaching program of the schools, and also provide services to the community. Ten schools of optometry have affiliations with one or more clinics located in such facilities as Veterans Administration hospitals; state public health facilities, and institutions for the mentally retarded.

Additional education programs are offered by several of the schools. Six of the university based optometry colleges have programs leading to the master's degree. Four of those schools also have Ph.D. programs. The master's and Ph.D. programs in physiological optics prepare students for careers in teaching and research.

Six of the optometry schools also now offer training programs for optometric technicians. These are usually two-year programs providing didactic, laboratory, and clinical experience in visual sciences, examination techniques, and office management. A certificate of completion or an associate degree is awarded. All optometry schools offer continuing education programs for practicing optometrists. Twenty-four states require evidence of continuing education for license renewal.

Most of the research conducted by schools of optometry takes place in the university-based schools. Research at present is not a major program in colleges of optometry, and much of it is now unsponsored.

Distribution of Optometrists

There were an estimated 19,000 optometrists practicing in the United States in 1973--one optometrist for each 11,000 people. This ratio varied across states, from 1:7,000 in South Dakota to 1:23,000 in Maryland.

About 400 to 500 optometric graduates are required annually to replace those who retire, although this number may rise because many optometrists graduated after World War II and the Korean conflict will retire in the 1980s.

The Sample of Schools

The four colleges of optometry that were selected for study reflect the diversity in geographic location, enrollment, and program characteristics of all the schools. The sample represents one-third of all schools in the profession. Table 92 compares the sample and the universe of schools for four key characteristics.

Table 93 lists the four sampled schools, showing for each its institutional setting, organizational relationship, and first degree enrollment.

Costs of Education*

Education costs per student range from $3,739 to $4,755. The average cost of education is $4,231. A summary of education costs per student for the four colleges of optometry is shown in Table 94

Costs are roughly 25 percent higher at the two university-based schools, Schools 1 and 3, than at the two freestanding schools. This is primarily because higher faculty/student ratios in the university-based schools result in 50 percent higher faculty costs.

Table 94 shows that there is greater variation in education costs than in instruction costs, which range from $3,739 to $4,377, a difference of only $638 per student. The small amounts of research done at the two freestanding schools are the principal factors that increase the range in education costs to $1,016.

The general methodology used for estimating costs-of education in all professions is described in detail in Part III. The methodology for schools of optometry reflects the particular relationships among their education, patient care, and research programs:

- Patient care takes place mainly in optometric clinics owned by the schools, and is performed primarily by students under faculty supervision. Since these clinics are operated principally for education, their operating costs are included in instruction costs

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* Unless otherwise specified all costs presented in the remainder of this chapter are annual costs.

TABLE 92

Comparison of Schools in the Sample to Total Number of Optometry Schools, 1972-73

Key variables	Sampled schools	Total
Organizational relationship		
Public	2	6
Private	2	6
Institutional settings		
Freestanding	2	5
University	1	5 a/
Health science center	1	2
Size of O.D. enrollment b/		
Less than 300	3	9
More than 300	1	3
Geographic distribution		
Northeast	1	3
North Central	1	3
South	1	3
West	1	3

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a/Includes the State University of New York School of Optometry. See footnote a/, Table 91.

b/Based on 1970-71 data from which sample was drawn.

TABLE 93

Ownership, Institutional Setting and Number of First Degree Students in Sampled Optometry Schools, 1972-73

School	Ownership	Institutional setting	Number of students
1	Public	University	250
2	Private	Freestanding	493
3	Public	Health science center	204
4	Private	Freestanding	260

TABLE 94

Average and Actual Education Costs per Optometry Student by Components of Cost, 1972-73

Components of cost	Average Costs	Actual costs School 1	Actual costs School 2	Actual costs School 3	Actual costs School 4
Total education costs	$4,231	$4,600	$3,831	$4,755	$3,739
Instruction costs	4,021	4,377	3,742	4,228	3,739
Faculty costs	1,201	1,431	1,015	1,460	899
Other direct costs	781	1,261	523	765	576
Indirect costs	755	631	1,137	711	541
Clinic costs	1,284	1,054	1,067	1,292	1,723
Research associated with education	210	223	89	527	0

- All research conducted by the school is considered essential to education and is included in education costs

- Where the optometry clinics and the school's research activities support graduate as well as first degree education, allocations are based on total instruction costs for both types of students.*

The allocation of faculty costs to education and other programs is based on an analysis of faculty activities recorded during one week in the spring of 1973. Optometry school faculty kept logs of their activities, then categorized each activity using one of the 13 activity categories defined in Chapter 3, Table 12. A summary of average full-time faculty hours by activity for each optometry school and the average across all four schools appears in Table 95. There is little variation in total faculty workweek, which averages 57 hours.

The following allocation rules were used to assign faculty costs to programs for each optometry school:

- 100 percent of faculty costs of joint teaching and patient care activities with optometry students is allocated to the instruction of first degree students

- 100 percent of the faculty costs of joint research and teaching with optometry students is allocated to first degree student instruction

- General support activities--administration, professional development, and writing--are allocated to programs in proportion to the time assigned to each program for all other activities.

Table 96 shows the average percent distribution of faculty time by program for each school and the average for the sample of optometry schools. This includes both full-time and part-time faculty. The data show that instruction of first degree students is the principal program at the optometry schools, accounting for 83 to 94 percent of faculty time. About half of this time is spent in student contact activities. On an average, optometry school faculty spend as much time in preparation as they do in direct teaching, and about half as much time in curriculum development and planning. Education of other students averages less than 5 percent of faculty time.

Faculty at the private freestanding schools spend on an average 10 percent more time in first degree student instruction than do faculty at the public university-based schools. One reason for this difference is that private school faculty on the average spend about

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* This procedure results in roughly 90 percent of research and clinic expenses being allocated to first degree optometry student education.

TABLE 96

Distribution of Faculty Time, by Instructional Activities, and Programs in Sampled Optometry Schools, 1972-73

Activities or Programs	Average	School 1	School 2	School 3	School 4
Total	100%	100%	100%	100%	100%
Instruction of first degree students					
Teaching	14	16	15	12	13
Joint teaching and patient care	26	23	20	34	25
Preparation	16	17	15	17	15
Curriculum development	6	4	10	5	5
Joint research and teaching	1	3	b/	1	1
Clinic costs	9	6	17	2	13
Other a/	16	14	15	12	22
Total	88	83	92	83	94
Other instruction	4	7	b/	8	2
Research	5	7	4	8	0
Service	3	3	4	1	4

NOTE: Includes both full-time and part-time faculty.

a/Administration, professional development, and writing allocated to first degree instruction.
b/Less than 0.5 percent

15 percent of their time in patient care without students and public school faculty spend only 4 percent. On the other hand, although the percentages are very small in both cases, public school faculty spend twice as much time in research and four times as much time educating other types of students.

Each of these optometry schools makes extensive use of part-time faculty who devote almost all of their time to teaching, primarily in the optometry clinics, and to preparation for teaching. In one of the schools, part-time faculty make up almost half of the total full-time equivalent (FTE) faculty; in this school they also engage in administrative and other general support activities.

Sources of Variation in Education Costs

The major reasons for variation in education costs of optometry schools are:

- Faculty costs per student--differences in these costs are more related to the faculty/student ratios than to faculty salaries, which range from $11,200 to $15,521
- Other direct costs per student, including staff salaries and other operating expenses
- Research costs per student, a function of the total amounts spent for research in each school.

Variation among schools in the faculty costs of instructing candidates for the first degree is explained by differences in faculty salaries* and differences in the instructional faculty/student ratio,** which measures the amount of faculty resources devoted to first degree instruction.

Faculty salaries average $13,037, ranging from $11,200 to $15,521; they tend to be lower at schools that use large numbers of part-time faculty, since part-time faculty compensation generally carries a lower rate.

The instructional faculty/student ratio in the sampled schools ranges from one faculty member for every 8 students to one for every 15 students.

The effect of faculty costs on instruction costs can be measured by recomputing instruction costs for each school, holding one, and then both, faculty cost factors constant at the average level for all schools. The extent to which each of these factors account for the variation in instruction costs can then be measured by changes in the range of instruction costs. Table 97 shows the cost for each factor and the recomputed ranges in instruction costs:

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*Average faculty salaries are shown on an FTE basis. They are computed by dividing total faculty costs by the number of FTE faculty at each school.

**Instructional faculty/student ratio is computed by dividing the number of faculty by the number of per first degree students and multiplying the result by the average percent of faculty time spent in the instruction of these students.

The actual range in instruction costs is $638. The following changes in the range were obtained by using average costs:

- Holding faculty salaries constant at the average level increases the range in instruction costs by 41 percent. This is because the school with the highest instruction costs, School 1, has the lowest faculty salaries while the next to lowest school, School 2, has the highest salaries. Thus, substituting the overall average increases instruction costs for the high-cost school and decreases them for the low-cost school, increasing the range

- The range in instruction costs is reduced 56 percent by holding the instructional faculty/student ratio constant at the average level. The two low-cost schools have below average ratios and the two high-cost schools have above average ratios. Substituting the average ratio for each school raises the costs of the low-cost schools and lowers the costs of the high-cost schools, thus reducing the range

- Holding both factors constant at their average levels is equivalent to substituting the average faculty costs per student, $1,201, at each school; this reduces the range by 66 percent.

Thus, faculty costs, particularly instructional faculty/student ratios, are the major reason for cost variation.

Variation in instruction costs is also caused by differences in other direct, indirect, and clinic costs. Other direct costs, indirect costs, and clinic costs per student vary greatly among the four optometry schools. To determine the effect of these factors on instruction costs, the average cost of each factor is substituted for the actual cost in each school, and instruction costs are recomputed. Table 98 shows the results of the analysis:

- The range of costs decreases by 45 percent when average other direct costs per student are substituted for each school because this reduces costs at School 1, a high-cost school, and increases costs at the low-cost schools

- Substituting average indirect costs per student of $755 increases the range in instruction costs by 79 percent, since this increases costs at the high-cost schools and lowers them at the low-cost schools

- Substituting the combined average of the above factors increases the range only slightly

- Substituting average clinic costs per student of

TABLE 97

Variation in Range of Instruction Costs per Optometry Student Due to Differences in Faculty Costs, 1972-73

Source of change	Range	Percent reduction (increase)
Range of the sampled schools	$638	NA
Range computed by substituting average faculty salary of $13,037 a/	902	(41)
Range computed by substituting average instructional faculty/student ratio of one faculty for every 11 students b/	281	56
Range computed by substituting average faculty salary and average instructional faculty/student ratio	219	66

a/Actual range in faculty salaries is $11,200 to $15,521.

b/Instructional faculty/student ratios range from one faculty for every 8 students to, one for every 15 students.

TABLE 98

Variation in Range of Instruction Costs per Optometry Student Due to Differences in Non-Faculty Costs, 1972-73

Source of change	Range	Percent reduction (increase)
Range of sampled schools	$ 638	NA
Range computed by substituting average amount of other direct costs of $781 a/	348	45
Range computed by substituting average amount of indirect costs of $755 b/	1,141	(79)
Range computed by substituting average amount of direct and indirect costs of $1,536	670	(5)
Range computed by substituting average amount of clinic costs of $1,284 c/	1,307	(105)

a/Actual range in other direct costs is $523 to $1,261.
b/Actual range in indirect costs is $541 to $1,137.
c/Actual range in clinic costs is $1,054 to $1,723.

$1,284 more than doubles the range of instruction costs. School 4, the lowest-cost school, has the highest clinic costs per student. Substituting average clinic costs makes the instruction costs for School 4 only $3,300 per student. School 1, the highest-cost school, has the lowest clinic costs per student; substituting the average cost increases its instruction costs to $4,607.

Variation in education costs not explained by instruction cost variation is due to differences in institutions' research programs. When the costs of research related to the education of optometry students are included, the range increases substantially. The university-based public schools, with the highest instruction costs, also engage in the greatest amounts of research.

Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

In computing these expenditures for optometry schools, research and clinic revenues are apportioned to first degree education and graduate education programs based on the total instruction costs of these programs. Revenues allocated to the education program for first degree students are then deducted from the education program's costs to produce net education expenditures for schools of optometry.

Net education expenditures for the four optometry schools, displayed in Table 99, range from $2,561 to $3,422 per student; the average is $3,113.

School 3, which has the highest education costs, drops to the next to lowest in net education expenditures. This reflects the school's ability to generate revenues for its research and patient care activities. The other three schools maintain the same relative rankings as for education costs. The range in net education expenditures is $861, about $155 less than the range of education costs.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recommends their use as the basis for setting capitation rates. Table 100 shows the relationship of authorized and actual capitation amounts to net education expenditures for each optometry school in the sample. On the average, about one-fourth of net education expenditures are covered by authorized capitation amounts while about one-tenth are covered by actual amounts.

TABLE 99

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Optometry Student, in Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Sponsored research	Clinic	
1	$4,600	$ 25	$1,153	$3,422
2	3,831	15	509	3,307
3	4,755	209	1,384	3,162
4	3,739	0	1,178	2,561
Average	4,231	62	1,056	3,113

TABLE 100

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Optometry Student, in Sampled Schools, 1972-73

School	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
1	$3,422	$800	23	$323	9
2	3,307	800	24	321	10
3	3,162	800	25	323	10
4	2,561	800	31	363	14
Average	3,113	800	26	333	11

Table 101 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in optometry, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

Sources of Income for Schools of Optometry

Table 102 shows the percent distribution of 1972-73 sources of income for the four optometry schools in the sample. Education income ranges from 58 percent to 87 percent of total income. The two private schools derive about one-half of their income from tuition; the two public schools derive 15 percent and 22 percent.

Federal capitation support accounts for 9 to 16 percent of total income for the four schools, and 13 to 22 percent of education income. However, three of the four schools receive Federal special project funds. Combining these two sources, the schools receive roughly 20 percent of their total income in the form of Federal institutional support.

Three of the four schools receive a substantial part of their income from their clinics. There is no apparent difference in the role of clinic income between public and private schools.

Summary

The annual per student cost of educating candidates for the O.D. degree ranges from $3,739 to $4,755; the average is $4,231. The two private freestanding schools in the sample have costs of $3,739 and $3,831; the two university-based schools have costs of $4,600 and $4,775. The roughly $900 range between university-based schools and freestanding schools is because of differences in faculty costs, other direct instruction costs, and the costs of research.

Net education expenditures for optometry schools range from $2,561 to $3,422 per student, with an average of $3,113. Net education expenditures are lower than education costs for each school, reflecting the ability to obtain funding from research and patient care buyers to cover part of education costs. The currently authorized capitation of $800 per student covers 26 percent of average net education expenditures, and the actual average capitation of $333 covers 11 percent.

Capitation amounts per student of $778, $1,037, and $1,245 would be required to cover 25 percent, 33—1/3 percent, and 40 percent, respectively, of average net education expenditures for schools of optometry.

TABLE 101

Percent of Net Education Expenditures per Optometry Student at Different Levels of Capitation in Sampled Schools, 1972-73

School	Net education expenditures per student	Capitation at 25 percent of average net education expenditures ($778)	Capitation at 33-1/3 percent of average net education expenditures ($1,037)	Capitation at 40 percent of average net education expenditures ($1,245)
1	$3,422	23%	30%	36%
2	3,307	24	31	38
3	3,162	25	33	39
4	2,561	30	40	49

TABLE 102

Distribution of Income by Source, in Sampled Optometry Schools, 1972-73

Income source	School 1 (public)	School 2 (private)	School 3 (public)	School 4 (private)
Total	100%	100%	100%	100%
Education income	60	87	58	70
Tuition and fees	15	49	22	46
Gifts and endowments	0	3	a/	9
Teaching/Training grants	0	0	0	0
Other institutional support	a/	14	a/	2
State general appropriation	21	5	14	0
Federal capitation	13	16	10	9
Federal special project	11	0	12	4
Patient care income	25	13	28	30
Research income	a/	a/	4	0
Other non-education income	0	0	0	0
General university support	15	0	10	0

a/Less than 0.5 percent.

Chapter 9

PHARMACY

The pharmacist is trained in the compounding of drugs, in methods of testing them for purity and potency, and in their pharmacological effects when administered singly or in combination as a therapeutic measure in human disease.

More than 80 percent of pharmacists practice in community drugstores; of that group about 40 percent own their pharmacy, either singly or as a partner. Pharmacists also work in hospitals, health maintenance organizations (HMO's), and nursing homes. About 10 percent of active pharmacists practice in clinical settings. Four percent of active pharmacists are employed by the drug manufacturing industry in quality control, research, or drug information programs. The remainder of active pharmacists is employed by educational institutions or by the government.

The pharmacy profession and education for it have changed greatly since World War II. The pre-war emphasis on individual compounding of medications required education centered on chemistry. The wartime swing and continuing trend of pharmaceutical manufacturing to mass production lessened the need for pharmacists in the compounding of drugs. As a result, pharmacy education shifted toward an emphasis on the effects of drugs in biological systems. More recently, the profession's educators and members have expanded their concerns to encompass a utilization of pharmacists as integral members of health care delivery teams.*

All states and the District of Columbia require that pharmacists be licensed to practice. In most jurisdictions, licensing requires graduation from an accredited school, passing a written examination administered by a state board of pharmacy and completion of a one-year internship, usually in a community pharmacy. However, the accrediting standards that are to go into effect July 1, 1974, recommend that pharmacy school curricula provide clinical experience that would substitute for part of the internship requirement for licensure. Also, the National Association of Boards of Pharmacy recently developed a uniform national examination that has been adopted for use by most of the individual state boards.

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*In 1972, The American Association of Colleges of Pharmacy established the Pharmacy Manpower Information Project to examine the scope of pharmacy services and to project manpower and educational program requirements. The Commission report is due in September, 1974.

The Professional Schools

Pharmacy education is provided by 73 schools of pharmacy, of which 54 are public and 19 are private. In 1972-73, these schools had total enrollments of 23,656, including all years in all programs. Almost all of the schools are part of a university or a health science center; only three are freestanding private schools. All schools except two offer a bachelor's degree in pharmacy (B.S. or B.Pharm.) as the first professional degree. The University of California and the University of Southern California offer the Pharm.D. as the first degree. More than half of the schools also offer the M.S., the Ph.D., or both in pharmaceutical sciences and in administrative areas.

There are considerable differences in program emphasis among schools of pharmacy. The freestanding schools devote most of their resources to education of candidates for the first professional degree, with the remainder devoted to continuing education and public service. Other pharmacy schools, usually located in universities or health science centers, have substantial graduate and research programs and devote only 20 to 30 percent of their resources to first degree students.

Professional Education

The bachelor's degree program in pharmacy requires five years of post-secondary education. The curriculum includes courses in liberal arts, basic sciences, pharmaceutical sciences, and pharmacy administration, as well as clinical experience. Accreditation standards require that students complete at least three of the five years of the first degree program in the school of pharmacy, but in some schools students are enrolled in the school in their first or second year.

Regardless of when students enroll in the pharmacy school, the first two years of study are principally devoted to liberal arts, usually taken outside the school of pharmacy,* and the last three years are devoted to required pharmacy courses and electives. If the school is university based, some required basic science courses such as biochemistry, physiology, and microbiology, are frequently taken outside the pharmacy school, as are electives such as social sciences, business administration, and mathematics.

In order to prepare graduates to work with other professionals and to meet the requirements for Federal capitation grants, the pharmacy curriculum in most schools now includes anatomy, physiology, pathology, and clinical experience. The clinical training may include preceptorships with community or hospital pharmacists. In a hospital, students take patients' drug histories, attend ward rounds with physicians, keep records of patient diagnoses and the drug therapy used, and make case presentations to instructors and fellow students. In some programs the pharmacy students work in the emergency room setting. Not all pharmacy schools offer extensive clinical training, but the amount and complexity of clinical training is increasing. Postgraduate clinical training in the form of a hospital-based residency is taken by some pharmacy graduates. The accrediting body for pharmacy residencies is the American Society of Hospital Pharmacists.

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*The three freestanding pharmacy schools are exceptions in that they offer liberal arts and pharmacy courses.

The Pharm.D. is the first pharmacy degree offered by the University of California and the University of Southern California. This four-year professional program, which is strongly clinical in orientation, requires at least two years of pre-professional education in humanities, social sciences, and basic sciences. In some additional schools the Pharm.D. is offered as a second professional degree, consisting of one or two years additional study after completing requirements for the bachelor's degree in pharmacy. Other schools offer the six-year Pharm.D. as an alternative first degree to the five-year B.S. or B.Pharm. degree.

Distribution of Pharmacists

As of January 1, 1972, there were about 130,750 active pharmacists in the United States, or 63 pharmacists per 100,000 population. This ratio has remained essentially constant since 1963. The geographic distribution of pharmacists is somewhat less uneven than the distribution of some other health professionals. Hawaii, with 28 pharmacists per 100,000 population and Pennsylvania, with 90 pharmacists per 100,000 population, represent the extremes of distribution. Only eight states, however, have fewer than 50 pharmacists per 100,000 population.

The Sample of Schools

The costs of pharmacy education are based on a sample of ten schools of pharmacy located throughout the United States. Four of the schools are in health science centers, five are university based, and one is a freestanding school. Of the university affiliated schools, one is located in a different city from the university campus, and therefore functions independently. Professional enrollments in the schools range from 150 to over 400 students, and total expenditures range from $100,000 to over $2-million. Several of the schools have extensive graduate programs. Table 103 compares the sample to the total population of pharmacy schools for four key characteristics.

TABLE 103

Comparison of Schools in the Sample to Total Number of Pharmacy Schools, 1972-73

Key variables	Sampled schools	Total
Organizational relationship		
Public	7	54
Private	3	19
Institutional settings		
Freestanding	1	3
University	5 a/	31
Health science center	4	39
Size of first degree enrollment b/		
Less than 300	7	58
More than 300	3	15
Geographic distribution		
Northeast	3	14
North Central	2	21
South	3	26
West	2	12

a/ Includes one school that is university affiliated, but not located on the university campus and therefore acts as an independent school.

b/ Based on 1970-71 data from which sample was drawn.

Table 104 lists the 10 sampled schools, showing for each its institutional setting, organizational relationship, and first degree enrollment. For nine of the ten schools, the enrollment figures represent the number of students in the final three years of the bachelor of pharmacy program.* Because second-year students in School 10 take half of their courses in the pharmacy school, the student numbers for that school include students in the final three years plus half of the second-year class.

Costs of Education**

Education costs per student are displayed in Table 105. Costs range from $1,579 in School 7 to $5,745 in School 3, with an average of $3,543. The one freestanding school and the geographically independent university-based school, Schools 7 and 2 respectively, are in the lower part of the range. Three of the four highest-cost schools are in health science centers. However, one health science center school, School 10, is one of the three lowest-cost schools. As the table shows, the high-cost schools have relatively high instruction costs and high research costs. Instruction costs range from $1,479 to $3,901, with an average of $2,593.

For purposes of developing the costs of education to the first professional degree in pharmacy, the liberal arts portion of the five-year program was excluded and the professional curriculum was defined to include:

- All courses, required and elective, taken during the last three years of the five-year program
- All pharmacy courses taken during the first two years, such as introduction to pharmacy, pharmacy orientation, pharmacy calculations
- Certain basic science courses, frequently taken during the last three years, but taken in the second year at some institutions, and not considered to be liberal arts courses. Examples are organic chemistry, biochemistry, and microbiology.

The general methodology used for estimating costs of education in all professions is described in detail in Part III. The methodology for schools of pharmacy reflects the particular relationships among their education, patient care, and research programs:

***All 10 schools in the sample offer the Bachelors degree, rather than the Pharm.D. degree, as the first professional degree.**

**Unless otherwise specified, all costs presented in the remainder of this chapter are annual costs.

TABLE 104

Ownership, Institutional Setting and Number of First Degree Students in Sampled Pharmacy Schools, 1972-73

School	Ownership	Institutional setting	Number of students
1	Public	University	364
2	Private	University	268
3	Public	University	216
4	Public	Health science center	242
5	Public	University	265
6	Public	University	153
7	Private	Freestanding	422
8	Public	Health science center	206
9	Public	Health science center	271
10	Private	Health science center	323

TABLE 105

Average and Actual Education Costs per Pharmacy Student, by Components of Cost, 1972-73

Components of cost	Average costs	Actual costs									
		School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10
Total education costs	$3,543	$1,839	$2,632	$5,745	$4,863	$2,733	$2,650	$1,579	$5,277	$5,677	$2,432
Instruction costs	2,593	1,594	2,397	3,901	3,112	2,460	1,915	1,537	3,823	3,712	1,479
Faculty costs	770	500	1,000	984	1,002	848	655	466	910	759	577
Other direct costs	555	362	406	1,130	495	626	311	186	393	1,284	361
Indirect costs	794	509	991	812	993	544	451	762	1,641	741	497
Outside instruction costs a/	473	223	0	975	622	442	498	123	879	928	44
Research associated with education	781	232	50	1,761	1,322	229	220	27	1,335	1,759	878
Patient care associated with education	168	13	185	83	429	44	515	15	119	206	75

a/Courses taken outside the pharmacy school.

- All of the patient care activities of pharmacy faculty are necessary to support the education program and to maintain the professional competence of the faculty. Therefore, the costs of patient care are included in education costs

- All research is necessary to education and to maintain the professional competence of the faculty and is included in education costs

- In the schools with graduate programs, patient care and research costs are divided between the undergraduate and graduate programs on the basis of total instruction costs for both types of students.

Because a significant proportion of pharmacy instruction takes place outside the pharmacy school, allocating the expenditures of the pharmacy school to the first professional degree program does not fully capture the costs of that program. In only one pharmacy school in the sample is the entire professional curriculum is given inside the school. As Table 106 shows, in five of the sampled schools 20 percent or more of the professional curriculum is given outside the school.

To determine total education costs, instruction costs were adjusted upward for the nine sampled schools that consume resources not reflected in the pharmacy school budgets. The methodology was as follows:

- The proportion of professional credits given inside and outside the pharmacy school is determined. The assumption is made that students take two-thirds of elective credits inside the pharmacy school

- Pharmacy school instruction costs are increased to account for 100 percent of instruction costs. If, for example, a pharmacy school's costs are $2,000 per student and it is determined that 80 percent of the curriculum is given by the pharmacy school, then the total cost of instruction is $2,000 divided by 80 percent, or $2,500

This procedure assumes that the average costs of outside courses are equal to the costs of pharmacy school courses. The study staff observed that in most schools, courses taken outside the pharmacy school include a mixture of low-cost lecture courses and high-cost laboratory courses that is about the same as the mixture taken in the pharmacy school. However pharmacy students in some health science center schools take courses in medical schools, where costs are higher. Therefore, for these schools outside costs may be somewhat underestimated.

TABLE 106

Percent of Professional Pharmacy Curriculum Given Outside the Sampled Pharmacy Schools, 1972-73

School	Percent
1	14
2	--
3	25
4	20
5	18
6	26
7	8
8	23
9	25
10	3

Pharmacy schools are increasing the proportion of clinical courses, which are costly because they require a higher number of faculty per pharmacy student. Therefore, the costs of courses offered within the schools will probably increase. Any assumptions on the relative costs of courses offered within pharmacy schools and those offered outside will have to be re-examined in the future.

The allocation of faculty costs to first degree pharmacy education and other programs is based on an analysis of faculty activities recorded during one week in the spring of 1973. Pharmacy school faculty kept logs of their activities, then categorized each activity using one of the 13 activity categories defined in Chapter 3, Table 12. A summary of average full-time faculty hours by activity for each pharmacy school and the average for all ten schools appears in Table 107. An average full-time faculty workweek is 59 hours; almost half of faculty time is devoted to instructional activities.

The following allocation rules were used to assign faculty costs to programs for each pharmacy school:

- 100 percent of faculty costs of joint teaching and patient care activities with pharmacy students is allocated to the instruction of first degree students

- 100 percent of the faculty costs of joint research and teaching with pharmacy students is allocated to first degree pharmacy instruction

- General support activities--administration, professional development, and writing--are allocated to programs in proportion to the time assigned to each program for all other activities.

Table 108 shows the average percent distribution of faculty time by program for each school and the average for the sampled pharmacy schools.

On the average, pharmacy school faculty members spend almost one-half of their time in the instruction of first degree students, although this percentage varies from 29 to 66 percent. Faculty in the four health science center schools average about 20 percent less time in first degree instruction than do faculty in the other six schools. For all the schools, first degree instruction consists of about one-third student contact time and two-thirds time in activities supporting instruction--course preparation, curriculum development, and administration. In addition, faculty spend an average of 21 percent of their time instructing students other than pharmacy students, raising the proportion of faculty time spent in instruction to 70 percent.

TABLE 107

Average Hours per Week of Full-Time Faculty, by Activity, in Sampled Pharmacy Schools, 1972-73

Activity	Average	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10
Total	59	56	59	62	58	54	52	56	61	67	62
Teaching activities											
Teaching	10	16	10	9	6	12	7	12	10	8	7
Preparation	15	19	17	14	7	12	11	26	12	12	15
Curriculum development	4	3	5	5	2	7	6	7	3	6	1
Joint activities											
Joint teaching and patient care	1	0	1	0	2	1	6	0	1	0	1
Joint research and teaching	2	1	1	2	2	1	1	1	4	4	2
Research activities											
Independent research	7	5	1	12	5	3	5	1	7	10	19
Patient care activities											
Patient care	2	1	8	1	1	1	0	1	1	0	3
Hospital administration	1	0	2	1	3	0	1	0	0	0	2
Service activities											
Service	3	2	2	2	4	3	6	1	3	10	2
General support activities											
Administration	7	3	10	9	15	8	5	3	7	6	4
Professional development	5	6	2	5	8	5	3	2	8	9	6
Writing	2	0	0	2	3	1	1	2	5	2	0

TABLE 108

Distribution of Faculty Time, by Instructional Activities and Programs in Sampled Pharmacy Schools, 1972-73

Activities or Programs	Average	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Instruction of first degree students											
Teaching	12	19	15	13	7	19	9	12	7	9	7
Joint teaching and patient care	2	b/	b/	1	1	2	11	b/	b/	0	1
Preparation	17	24	27	13	9	17	17	29	9	12	17
Curriculum development	6	3	7	4	2	12	8	11	3	7	2
Joint research and teaching	1	b/	1	b/	1	1	b/	1	b/	1	0
Other a/	12	17	12	11	27	15	10	8	10	8	6
Total	50	63	62	42	47	66	55	61	29	37	33
Other instruction	20	10	9	25	23	17	12	33	34	20	17
Research	16	14	1	25	15	10	13	2	26	22	35
Patient care	7	10	18	5	7	2	3	1	3	5	11
Service	8	3	10	3	8	5	17	3	8	16	4

NOTE: Includes both full-time and part-time faculty

a/Administration, professional development, and writing allocated to first degree instruction.
b/Less than 0.5 percent.

In the sampled schools, faculty spend from 1 to 35 percent of their time in research, averaging 16 percent. Faculty in the health science center schools average about twice as much time in research as do faculty in the other schools. However, one university-based school, School 3, resembles the health science center schools in distribution of faculty time between instruction of first degree students and research.

Little faculty time is devoted to patient care activities without students, an average of 7 percent. Generally only clinical pharmacy faculty who are hospital based, most of whom are partially paid by the hospital, devote time to patient care activities without students present.

Sources of Variation in Education Costs

The major reasons for variation in education costs of pharmacy schools are:

- Non-faculty costs per student, including direct and indirect costs
- Costs per student for the portion of the professional curriculum that is taken outside pharmacy schools
- Research costs per student, a function of the schools' total research program expenditures.

As shown in Table 105, the high-cost pharmacy schools, those with costs per student over $5,000, have either high other direct costs or high indirect costs, or both, as well as high "outside" costs and research costs. For the low-cost schools, those with costs between $1,800 and $2,400, all of the components are low, except for the research component of School 10.

Variation among schools in the faculty costs of instructing candidates for the first degree is explained by differences in faculty salaries* and differences in the instructional faculty/student ratio,** which measures the amount of faculty resources devoted to first degree instruction.

Faculty salaries average $16,500, ranging from $13,952 to $20,558.

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*Average faculty salaries are shown on a full-time equivalent (FTE) basis. They are computed by dividing total faculty costs by the number of FTE faculty at each school.

**Instructional faculty/student ratio is computed by dividing the number of faculty by the number of first degree students and multiplying the result by the average percent faculty time spent in the instruction of these students.

The instructional faculty/student ratio in the sampled schools ranges from one faculty member for every 15 students to one for every 50 students; the average is 1:22.

The effect of faculty costs on instruction costs can be measured by recomputing instruction costs for each school, holding one, and then both, faculty cost factors constant at the average value for all schools. The extent to which each of these factors account for the variation in instruction costs can then be measured by changes in the standard deviation of instruction costs.*

Table 109 shows the size of the actual standard deviation in instruction costs and the changes in that amount when the average cost for all schools is substituted for actual cost at each school. The substitution does not affect instruction costs greatly because the range in faculty costs per student is fairly small compared with the range in other components of instruction costs. Only the combination of the two variables held constant produces any appreciable change in the standard deviation, reducing it 15 percent.

More of the variation in instruction costs is explained by differences in other direct and indirect costs. To determine the effect of these factors on instruction costs, the average cost of each factor is substituted for the actual cost in each school, and instruction costs are recomputed. Table 110 shows the results of the analysis:

- Substituting average other direct costs per student of $555 reduces the standard deviation by 23 percent because there is a large range in other direct costs per student, with costs for School 9 almost seven times higher than for School 7
- Substituting average indirect costs per student of $794 reduces the standard deviation by 18 percent. The levels of indirect costs per student also have a large range, with costs for School 8 about $650 above the next highest school, School 4
- Substituting the average of other direct costs plus indirect costs per student, $1,349, decreases the standard deviation of instruction costs by 48 percent

Costs of pharmacy instruction borne by the school of pharmacy--faculty salaries, other direct costs, and overhead--account for about 60 percent of the variation in instruction costs per student. The

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*The standard deviation was chosen for variation analysis because it is a measure of dispersion that is not unduly affected by extreme cases in the data.

TABLE 109

Variation in Standard Deviation of Instruction Costs per Pharmacy Student Due to Differences in Faculty Costs, 1972-73

Source of change	Standard deviation	Percent reduction
Standard deviation of sampled schools	$978	NA
Standard deviation computed by substituting average faculty salary of $16,500 a/	939	4
Standard deviation computed by substituting average instructional faculty/student ratio of one faculty member for every 22 students b/	905	7
Standard deviation computed by substituting average faculty salary and average instructional faculty/student ratio	832	15

a/Actual range in faculty salaries is $13,952 to $20,558.

b/Actual range in instructional faculty/student ratio is one faculty member for every 15 students to one for every 50 students.

TABLE 110

Variation in Standard Deviation of Instruction Costs per Pharmacy Student due to Differences in Non-Faculty Costs, 1972-73

Source of change	Standard deviation	Percent reduction
Standard deviation of sampled schools	$978	NA
Standard deviation computed by substituting average amount of other direct costs of $555 a/	757	23
Standard deviation computed by substituting average amount of indirect costs of $734 b/	802	18
Standard deviation computed by substituting average amount of other direct and indirect costs	506	48

a/Actual range in other direct costs is $186 to $1,284.
b/Actual range in indirect costs is $451 to $1,641.

rest of the variation is due to the costs of instruction provided to pharmacy students by other schools in the university or health science center. Table 105 shows that the schools with high education costs have high instruction costs and relatively high proportions of their curriculum taken outside.

Variation in education costs not explained by differences in instruction costs is due to differences in the size of the institutions' research and patient care programs. Although research and patient care costs are allocated proportionally to first degree students and graduate students, graduate programs consume no more than 25 percent of these costs in any school. Research costs per student at the sampled schools range widely--from $27 to $1,761. Because the schools with high instruction costs also have high research costs, the range increases by about 40 percent when the two components are added. Patient care costs per student also vary greatly--from $13 to $515--but because they are low relative to research expenditures they have little effect on education costs.

Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

In computing these expenditures for pharmacy schools, research and patient care revenues are apportioned to first degree education and graduate education programs based on the total instruction costs of these programs. Revenues allocated to the education program for first degree students are then deducted from the education program's costs to produce net education expenditures for pharmacy.

Net education expenditures for the ten pharmacy schools, presented in Table 111, range from $1,579 to $4,964 per student; the average is $3,040.

Most of the pharmacy schools have no patient care income, because pharmacists do not generate fees. However, one of the sample schools, School 6, runs a pharmacy which produces income. Patient care income for School 2 and School 4 consists of payment of faculty salaries by hospitals. These clinical pharmacy faculty teach pharmacy students, as well as carry out patient care activities such as dispensing drugs and attending rounds in the hospital.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recommends their use as the basis for setting capitation rates. Table 112 shows the relationship of authorized and actual capitation amounts to net education expenditures for each pharmacy school in the sample.

TABLE 111

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Pharmacy Student, in Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Sponsored research	Patient care	
1	$1,839	$ 107	$ 0	$1,732
2	2,632	23	185	2,424
3	5,745	926	0	4,819
4	4,863	451	61	4,351
5	2,733	139	0	2,594
6	2,650	424	309	1,917
7	1,579	0	0	1,579
8	5,277	1,351	0	3,926
9	5,677	713	0	4,964
10	2,432	340	0	2,093
Average	3,543	447	56	3,040

TABLE 112

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Pharmacy Student, in Sampled Schools, 1972-73

School	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
7	$1,579	$800	51	$448	28
1	1,732	800	46	323	19
6	1,917	800	42	332	17
10	2,093	800	38	368	18
2	2,424	800	33	404	17
5	2,594	800	31	512	20
8	3,926	800	20	328	8
4	4,351	800	18	402	9
3	4,819	800	17	332	7
9	4,964	800	16	415	8
Average	3,040	800	26	386	13

On the average, about one-third of net education expenditures are covered by authorized capitation amounts while about one-seventh are covered by actual amounts.

Table 113 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in pharmacy, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

Sources of Income

Table 114 shows the percent distribution of income by source for the ten pharmacy schools in the sample. Education income is the largest type of income for most of these schools. Except for School 8, for which education income is only 19 percent of total income, the schools derive at least 50 percent of their income from sources funding educational programs.

Public schools receive from 12 to 51 percent of total income from tuition and fees. In the private schools, tuition income ranges from 27 to 80 percent of total income. None of the public pharmacy schools in the sample receive tuition directly from students; rather, it goes to the central administration of the university or to the state, which then allocates it to the school. The tuition figures are estimates, and may or may not be the amounts of tuition money actually received by the schools.

Two schools receive substantial portions of their revenues from sponsored research. School 10 receives 34 percent, and School 8 receives 28 percent. Two of the private schools, however, receive no sponsored research support.

Summary

Education costs for first degree students in pharmacy range from $1,579 to $5,745 per student; the average is $3,543. The differences in costs are principally due to direct instruction costs other than faculty costs: indirect costs; the costs of professional instruction outside the school of pharmacy; and the costs of research. Three of the four highest-cost schools are health science center schools; however, School 10, a health science center school, is one of the lower-cost schools.

Net education expenditures for pharmacy schools range from $1,579 to $4,964 per student, with a mean of $3,040. Net education expenditures are less than the cost of education for each school except School 7, which has no patient care or research income. The currently authorized capitation of $800 per student covers 26 percent of average net education expenditures and actual average capitation of $386 covers 13 percent.

Capitation amounts per student of $760, $1,012, and $1,216 would be required to cover 25 percent, 33-1/3 percent, and 40 percent, respectively, of average net education expenditures for schools of pharmacy.

TABLE 113

Percent of Net Education Expenditures per Pharmacy Student Covered at Different Levels of Capitation in Sampled Schools, 1972-73

School	Net education expenditures per student	Capitation at 25 percent of average net education expenditures ($760)	Capitation at 33-1/3 percent of average net education expenditures ($1,012)	Capitation at 40 percent of average net education expenditures ($1,216)
1	$1,732	44%	58%	70%
2	2,424	31	42	50
3	4,819	16	21	25
4	4,351	17	23	28
5	2,594	29	39	47
6	1,917	40	53	63
7	1,579	48	64	77
8	3,926	19	26	31
9	4,964	15	20	24
10	2,093	36	48	58

TABLE 114

Distribution of Income by Source, in Sampled Pharmacy Schools, 1972-73

Income source	Public schools							Private schools		
	1	5	6	4	3	9	8	2	7	10
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education income	63	93	71	65	50	78	19	79	99	50
Tuition and fees	21	17	51	12	32	13	7	53	80	27
Gifts and endowments	2	0	a/	a/	2	a/	0	a/	8	1
Teaching/training grants	0	0	0	0	a/	7	2	0	0	10
Other institutional support	9	0	0	0	1	8	0	3	2	0
State general appropriations	25	41	0 b/	48	12	45	7	0	0	0
Federal capitation	6	35	20	5	3	5	3	23	9	12
Patient care income	0	0	12	1	0	0	0	16	0	0
Research income	6	5	17	9	18	17	28	0	0	34
Other non-education income	0	0	0	a/	a/	0	0	0	1	0
General university support	31	2	0	25	32	5	53	5	0	16

a/Less than 0.5 percent
b/State appropriation does not exceed tuition and fees collected.

Chapter 10

PODIATRY

The podiatry profession is concerned with the diagnosis, treatment, and prevention of abnormal conditions of the human foot. The Doctor of Podiatric Medicine (D.P.M.) employs medical, surgical, and other therapeutic measures to the extent authorized by state licensure, which varies from one jurisdiction to another.

A 1970 survey by the National Center for Health Statistics (NCHS) reported 8,050 licensed podiatrists in the United States, 7,045 of them active practitioners. About 85 percent of the active podiatrists are in solo practice and 6 percent are in partnerships. Only 2 percent are in group practice and the remainder are employed by state or Federal government, the military, hospitals, or colleges. About 15 percent of the practitioners are qualified in one of the four podiatric specialties: orthopedics, surgery, radiology, and dermatology.

The survey also found that about 80 percent of all podiatric care is provided in the podiatrist's office, 8 percent in clinics or hospitals, and 9 percent in the patient's home or in nursing homes.

A large percent of podiatry patients are 65 years and older, an age group with a high incidence of foot ailments and systemic diseases that cause foot problems. In the latter instance, the podiatrist is trained to diagnose and refer a patient to the appropriate health professional.

Hospital admitting privileges for podiatrists and podiatric specialsits are determined by the governing boards of individual hospitals. Under procedures stipulated in standards of the Joint Commission on Accreditation of Hospitals, any podiatric admission is made with the concurrence of an appropriate member of the hospital's medical staff, who assumes responsibility for the patient's overall care. About one-fourth of practicing podiatrists presently have hospital privileges. Many major hospitals do not grant podiatrists inpatient privileges.*

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*In 1972, the Stanford University Hospital became one of the first major teaching hospitals to allow podiatrists surgical privileges.

All states, the District of Columbia, and the Commonwealth of Puerto Rico regulate the practice of podiatric medicine. Licensure requires graduation from an accredited college of podiatric medicine and successful completion of an examination. Forty states accept the results of examination by the National Board of Podiatry Examiners in lieu of, or in conjunction with, state examinations. The remaining states accept only the results of state board examinations. Three states--Michigan, New Jersey and Rhode Island--additionally require one-year internships before practice, and Oklahoma requires completion of a 90-day preceptorship or a one-year internship.

The Professional Schools

The first college of podiatric medicine in the United States was established in 1912, which also was the founding year of the first national association of podiatrists. By 1963, the five presently accredited colleges had been established. These five are private, freestanding institutions accredited by the Council on Podiatry Education of the American Podiatry Assoication (APA) to award the D.P.M. degree. The colleges are listed in Table 115 In 1972-73, they had a total of 1,487 students, 1,403 of whom were candidates for the first professional degree.

Two public colleges of podiatric medicine are being planned for health science centers in Texas and at the State University of New York at Stony Brook.

Professional Education

Admission to a school of podiatry requires at least two years of study at an accredited university or college, including specified minimum hours in biology, chemistry, physics, and the humanities. About 80 percent of students admitted have at least a baccalaureate degree. Since 1968, podiatry applicants must successfully complete a standardized Colleges of Podiatry Admission Test.

Four of the colleges have four-year programs leading to the D.P.M. degree at the completion of an average of 4,500 curriculum hours. In 1973, the fifth college instituted an accelerated, three-year program that requires 4,200 hours.

In a typical four-year program, the basic sciences, as well as ethics and jurisprudence, are included in the first two years of training. The clinical sciences are concentrated in the third and fourth years.

TABLE 115

Ownership and Institutional Setting of Colleges of Podiatric Medicine, 1972-73

School	Ownership	Institutional setting
California College of Podiatric Medicine, San Francisco	Private	Freestanding
Illinois College of Podiatric Medicine, Chicago	Private	Freestanding
New York College of Podiatric Medicine, New York	Private	Freestanding
Ohio College of Podiatric Medicine, Cleveland	Private	Freestanding
Pennsylvania College of Podiatric Medicine, Philadelphia	Private	Freestanding

All of the colleges operate outpatient clinics, with daily patient census ranging from about 150 to 250 patients; one college also operates a 28-bed inpatient hospital. In these settings students first observe, and then diagnose and treat patients under the supervision of clinical faculty. During the fourth year, several students usually share an examination and treatment room that resembles typical facilities used by practicing podiatrists.

All colleges of podiatric medicine are affiliated with one or more hospitals, where students serve rotations in podiatry clinics.

The five colleges combined employ about 180 full-time equivalent (FTE) faculty and share some faculty members with local colleges of medicine and dentistry. The basic sciences generally are taught by full-time faculty with Ph.D. or health professional degrees, the clinical medical specialties by M.D.s, and the clinical and didactic podiatric courses by D.P.M.s.

More than 50 percent of all podiatry graduates also complete a residency program of one or two years. About 145 first-year and 20 second-year residency programs are presently available. Residents receive advanced training in podiatric medicine and surgery and rotate through training assignments in emergency room service, anesthesiology, general medicine, pathology, general surgery, pediatrics, dermatology, neurology, and orthopedics. These programs are conducted in general hospitals, often in association with a college of podiatric medicine.

Each of the colleges of podiatric medicine sponsors programs of continuing education. Very little research is conducted at the colleges. None received Federal or state research grants in 1972-73; one had research funding of about $15,000 from a private source.

Distribution of Podiatrists

The ratio of podiatrists to population ranges from 6.1 for every 100,000 people in the northeast to 1.6 for every 100,000 in the south. The average 1970 ratio in the United States was 3.5:100,000.

Most podiatrists practice in urban areas of heavily populated states. In 1970, twelve states accounted for 84 percent of the active podiatrists and five states--in which the five colleges of podiatric medicine are located--accounted for 50 percent.*

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*California, Illinois, New York, Ohio, and Pennsylvania.

The Sample of Schools

Three colleges representative of the schools of podiatry were selected as a sample for cost finding. The sample represents 60 percent of all schools in the profession and reflects the diversity in geographic location, enrollment, and program characteristics of all the schools. Table 116 compares the study sample with the universe of schools for three key characteristics.

Costs of Education*

Education costs per student range from $4,421 to $6,680. The average cost of education is $5,736. A summary of education costs per student for the three schools of podiatry is shown in Table 117.

Two of the colleges have education costs that do not vary greatly--$6,108 and $6,680--whereas School 2 has costs of $4,421, about 30 percent lower. Almost all of the differences in costs are related to instruction costs; research is minimal and only one school has patient care costs beyond those included in instruction.

The general methodology used for estimating costs of education in all professions is described in detail in Part III. The methodology for schools of podiatry reflects the particular relationships among their education, patient care, and research programs:

- Patient care takes place mainly in podiatric clinics owned by the schools, and is performed primarily by students under faculty supervision. Since these clinics are operated principally for education, their costs are included in instruction costs**
- All research conducted by the school is considered essential to education and is included in education costs
- Where the schools' podiatric clinics and research activities support postgraduate or continuing education as well as first degree education, allocations are based on total instruction costs for all three types of students.

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*Unless otherwise specified all costs presented in the remainder of this chapter are annual costs.

**Because it was not possible to distinguish clinic costs from other costs at all the sampled schools, clinic costs are not displayed as a separate component. Rather, they are included in the four components of instruction costs. The patient care component of education costs displayed for School 3 represents costs of an inpatient facility.

TABLE 116

Comparison of Schools in the Sample to Total Number of Podiatry Schools, 1972-73

Key variables	Sampled schools	Total
Organizational relationship		
Public	0	0
Private	3	5
Institutional setting		
Freestanding	3	5
University or health science center	0	0
Size of D.P.M. enrollment		
Less than 300	2	3
More than 300	1	2

TABLE 117

Average and Actual Education Costs per Podiatry Student, by Components of Cost, 1972-73

Components of cost	Average costs	Actual costs School 1	Actual costs School 2	Actual costs School 3
Total education costs	$5,736	$6,108	$4,421	$6,680
Instruction costs [a]	5,556	6,081	4,400	6,186
Faculty costs	1,656	1,830	1,179	1,957
Other direct costs	633	753	362	784
Indirect costs	3,009	3,211	2,600	3,217
Depreciation	258	287	259	228
Research associated with education	25	27	21	28
Patient care associated with education	155	0	0	466

[a] Clinic costs are included in each of the components of instruction costs.

The allocation of faculty costs to education and other programs is based on an analysis of faculty activities recorded during one week in the spring of 1973. Podiatry school faculty kept logs of their activities, then categorized each activity using one of the 13 activity categories defined in Chapter 3, Table 12. A summary of average full-time faculty hours by activity for the three sampled schools appears in Table 118. The average workweek of 37 hours reflects the fact that in podiatry schools salaries are low, relative to medical schools for example, and faculty supplement their incomes with private practice. Therefore, the average of 37 hours spent at the institution does not include time spent in private patient care activities. Additionally, schools of podiatry do not have major independent research, patient care, and public service programs that require faculty time beyond the amount necessary for teaching. The 25 percent variation in average workweek is due primarily to differences in time spent in curriculum development and general support activities; the amount of time spent in student contact activities varies little.

The following allocation rules were used to assign faculty costs to programs for each podiatry school:

- 100 percent of faculty costs of joint teaching and patient care activities with podiatry students is allocated to the instruction of first degree students
- 100 percent of the faculty costs of joint research and teaching with podiatry students is allocated to first degree student instruction
- General support activities--administration, professional development and writing--are allocated to programs in proportion to the time assigned to each program for all other activities.

Table 119 shows the average percent distribution of faculty time by program for each school and the average for the sampled schools. Faculty-time in this table includes total faculty hours--both full-time and part-time. On the average, faculty spend almost one-half of their time in student contact activities--classroom teaching or joint teaching and patient care. An additional one-fourth of the faculty members' time, on the average, is spent in course preparation. Among the three schools, from 62 to 75 percent of faculty time is spent in student contact or preparation; when curriculum development time is added there is almost no difference among the schools. The faculty with lowest combined student contact and preparation time is in a school that is making curriculum changes; faculty at this school, therefore, spend a relatively large portion of time in curriculum development.

TABLE 118

Average Hours per Week of Full-Time Faculty, by Activity in Sampled Podiatry Schools, 1972-73

Activity	Average	School 1	School 2	School 3
Total a/	37	48	27	36
Teaching activities				
Teaching	5	5	6	5
Preparation	9	11	8	8
Curriculum development	4	9	1	b/
Joint activities				
Joint teaching and patient care	9	6	11	9
Joint research and teaching	b/	b/	b/	b/
Research activities				
Independent research	b/	1	b/	b/
Patient care activities				
Patient care	1	1	1	2
Hospital/clinic administration	b/	1	b/	b/
Service activities				
Service	1	2	b/	1
General support activities				
Administration	5	7	1	7
Professional development	2	5	b/	2
Writing	b/	b/	b/	1

a/Numbers may not add to totals due to rounding of component numbers to the nearest hour.
b/Less than 30 minutes.

TABLE 119

Distribution of Faculty Time, by Instructional Activities and Programs in Sampled Podiatry Schools, 1972-73

Activities or programs	Average	School 1	School 2	School 3
Total	100%	100%	100%	100%
Instruction of first degree students				
Teaching	18	16	25	13
Joint teaching and patient care	29	25	32	30
Preparation	22	21	18	27
Curriculum development	6	14	1	2
Joint research and teaching	0	0	0	0
Patient care	8	5	10	9
Other a/	15	17	13	15
Total	98	98	99	96
Other instruction	1	0	0	3
Research	1	2	1	1

NOTE: Includes both full-time and part-time faculty.

a/Includes administration, writing, service, professional development, and absence time.

All of the schools make extensive use of part-time faculty who spend most of their time in student contact or preparation activities. Part-time faculty make up from one-fourth to one-half of total clinical FTE's in the three schools. In one school over three-fourths of the basic science FTE's are part-time faculty.

Although the lowest-cost school uses almost no volunteer faculty two of the sampled schools use 9.4 and 11.5 FTE's of volunteer faculty in joint teaching and patient care activities. The volunteers, who rank equivalent to associate professors, would, if paid at an average salary of $15,000, increase the costs of education in the two schools by about 10 percent, or $600-$650 per student. The 0.8 FTE volunteers in the lowest-cost school would, if paid, increase its costs per student by $18.

The use of facilities and staff at affiliated hospitals, clinics, and other institutions is another resource that is consumed by the schools without a cash transfer. The costs of these resources have not been estimated, but their magnitude would be substantial. The colleges all supplement their clinical facilities with extensive use of affiliated institutions. For example, one school offers clinical rotations to first degree students in 16 in-state and out-of-state affiliated hospitals and clinics.

Sources of Variation in Education Costs

The major reasons for variation in education costs of podiatry schools are:

- Faculty costs per student, related to average faculty salaries and faculty/student ratios
- Other direct costs per student, including staff salaries and other operating expenses
- Indirect costs per student, including overhead costs.

The schools share several institutional features that cannot be considered as sources of variation in education costs; each is private, freestanding, and located in a large city. Each college had four-year first degree programs during the academic year 1972-73.

School 1, however, is undertaking major changes in facilities which increases direct and indirect costs, and School 3 has an extensive clinic setting that accounts for about half of its direct and indirect costs, and currently is implementing a three-year, accelerated program.

Variation among schools in the faculty costs of instructing candidates for the first degree is explained by differences in faculty salaries* and differences in the instructional faculty/student ratio,** which measures the amount of faculty resources devoted to first degree instruction.

Faculty salaries average $15,835, ranging from $14,012 to $17,188; they tend to be lower at schools that use the largest numbers of part-time faculty, since part-time faculty compensation generally carries a lower rate.

The instructional faculty/student ratio in the sampled schools ranges from one faculty member for every 8 students to one for every 12 students.

The effect of faculty costs on instruction costs can be measured by recomputing instruction costs for each school, holding one, and then both, faculty cost factors constant at the average level for all schools. The extent to which each of these factors account for the variation in instruction costs can then be measured by changes in the range of instruction costs. Table 120 shows the costs for each factor and the recomputed ranges in instruction costs holding each one and then both factors constant for all schools.

The actual range in instruction costs is $1,786. The following changes in the range were obtained by using average costs:

- Holding faculty salaries constant at the average level decreases the range in instruction costs by 17 percent This is because the school with the highest instruction costs, School 3, has the highest average faculty salaries and the school with lowest instruction costs, School 2, has the lowest average faculty salaries. Thus, substituting the overall average decreases instruction costs for the high-cost school and increases them for the low-cost school, increasing the range

- The range in instruction costs is reduced 23 percent by holding the instructional faculty/student ratio constant at the average level. Because the lowest-cost school has the lowest faculty/student ratio, its costs are increased by substituting the average cost, and costs at the other two schools are decreased

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*Average faculty salaries are shown on an FTE basis. They are computed by dividing total faculty costs by the number of FTE faculty at each school.

**Instructional faculty/student ratio is computed by dividing the number of faculty by the number of first degree students and multiplying the result by the average percent of faculty time spent in the instruction of these students.

TABLE 120

Variation in Range of Instruction Costs per Podiatry Student Due to Differences in Faculty Costs, 1972-73

Source of change	Range	Percent reduction
Range of the sampled schools	$1,786	NA
Range computed by substituting average faculty salary of $15,835 [a]	1,476	17
Range computed by substituting average instructional faculty/ student ratio of one faculty for every 10 students [b]	1,378	23
Range computed by substituting average faculty salary and average instructional faculty/ student ratio	930	47

a/Actual range is $14,012 to $17,188.
b/Instructional faculty/student ratios range from one faculty member for every 8 students to one for every 12 students.

- Holding both factors constant at their average levels is equivalent to substituting the average faculty costs per student, $1,656, at each school; this reduces the range by 47 percent.

Variation in instruction costs is also explained by differences in other direct and indirect costs. There is little variation in the amount of direct and indirect costs in the two high-cost schools, although in School 1 the costs probably reflect, in part, changes being made in curriculum and facilities and in School 2 they reflect the operations and overhead costs of an extensive clinical setting. In School 2 direct costs are about half those in the other schools and indirect costs are smaller by one-third. To determine the effect of these factors on instruction costs, the average value of each factor is substituted for the actual cost in each school, and instruction costs are recomputed. Table 121 shows the results of the analysis:

- The range of costs decreases by 24 percent when average other direct costs per student are substituted for each school because this reduces costs at the high-cost schools and increases costs at the low-cost school
- Substituting average indirect costs per student of $3,009 decreases the range in instruction costs by 35 percent, since this decreases costs at high-cost schools and increases them at the low-cost school. The reduction is greater than that which results from substituting average direct costs because indirect costs are a larger component of instruction costs
- Substituting the combined average of both factors decreases the range by 58 percent.

Three components of instruction costs--faculty costs, other direct operating costs, and indirect costs account for 80 percent of the variation in the sampled schools.

Variation in education costs not explained by instruction cost variation is due primarily to the operating costs of an inpatient clinical facility at School 3. Research costs represent only a small portion of education costs--less than 1 percent in each of the schools. Thus, differences in research costs do not cause variation in education costs among the three schools.

Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

TABLE 121

Variation in Range of Instruction Costs per Podiatry Student Due to Differences in Non-Faculty Costs, 1972-73

Source of change	Range	Percent reduction
Range of sampled schools	$1,786	NA
Range computed by substituting average amount of other direct costs of $633 a/	1,364	24
Range computed by substituting average amount of indirect costs of $3,009 b/	1,169	35
Range computed by substituting average amount of other direct and indirect costs	747	58

a/Actual range in other direct costs is $362 to $784.
b/Actual range in indirect costs $2,600 to $3,217.

In computing these expenditures for colleges of podiatry, research and patient care revenues are apportioned to first degree education and graduate education programs based on the total instruction costs of these programs. Revenues allocated to the education program for the first degree student are then deducted from the education program's costs to produce net education expenditures for podiatry.

Net education expenditures for the sampled podiatry schools, displayed in Table 122, range from $3,849 to $5,970 per student; the average is $4,905.

School 3, which has the highest education costs, is ranked second in net education expenditures. It has research revenues that equal costs and patient care revenues that cover about one-fourth of education costs. The other school with high education costs, School 1, has offsetting revenues that cover only about two percent of education costs, so that its net education expenditures are almost as high as its education costs. The range in net education expenditures is $2,121, about $140 less than the range of education costs.

Relation of Capitation to Costs

Because net education expenditures indicate the amounts of financing a school requires from education sources, the study group recommends their use as the basis for setting capitation rates. Table 123 shows the relationship of authorized and actual capitation amounts to net education expenditures for each college of podiatry. On the average, 17 percent of net education expenditures are covered by authorized capitation amounts and 9 percent are covered by actual amounts.

Table 124 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education costs in podiatry, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

Sources of Income for Schools of Podiatry

Table 125 shows the percent distribution of 1972-73 sources of income for the three colleges of podiatry in the study sample. Education income ranges from 49 percent to 96 percent of total income for two of the colleges and the second largest for the other college. Tuition and fees is the largest source of income for two of the colleges and the second largest for the other college.

TABLE 122

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Podiatry Student in Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Research	Patient care	
1	$6,108	$ 0	$ 138	$5,970
2	4,421	0	572	3,849
3	6,680	28	1,757	4,895
Average	5,736	9	822	4,905

TABLE 123

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Podiatry Student, in Sampled Schools, 1972-73

School	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
1	$5,940	$800	13	$398	7
2	3,849	800	21	413	11
3	4,895	800	16	399	8
Average	4,905	800	17	403	9

TABLE 124

Percent of Net Education Expenditures per Podiatry Student Covered at Different Levels of Capitation in Sampled Schools, 1972-73

School	Net education expenditures per student	Capitation at 25 percent of average net education expenditures ($1,226)	Capitation at 33 1/3 percent of average net education expenditures ($1,633)	Capitation at 40 percent of average net education expenditures ($1,962)
1	$5,970	21%	27%	33%
2	3,849	32	42	51
3	4,895	25	33	40

TABLE 125

Distribution of Income by Source, in Sampled Podiatry Schools, 1972-73

Income source	School 1	School 2	School 3
Total	100%	100%	100%
Education income	96	84	49
Tuition and fees	42	56	29
Gifts and endowments	a/	a/	a/
Teaching/training grants	2	12	12
Other institutional support	30	0	0
State general appropriation	10	0	0
Federal capitation	12	16	8
Patient care income	2	15	50
Research income	0	0	a/
Other	2	1	1

a/Less than 0.5 percent.

Federal capitation support accounts for 8 percent to 16 percent of total income for the schools. School 1 also receives unrestricted Federal support in addition to the capitation grant, shown as other institutional support in the table. The combined unrestricted Federal support in this school accounts for 42 percent of its income. School 1 is the only sampled school that receives state support. Patient care revenues as a percent of total income show the widest variation--from 2 percent in School 1 to 50 percent in School 3.

Summary

The annual per student cost of educating candidates for the D.P.M. degree ranges from $4,421 to $6,680; the average is $5,736. Costs at the two high-cost schools differ by only about $700; the range between the middle school and the low school, however, is almost $1,700. About 80 percent of the variation in costs is due to differences in faculty costs, other direct operating costs, and indirect costs. The extensive patient care facilities at the highest-cost school account for the rest of the variation.

Net education expenditures for podiatry schools range from $3,849 to $5,970 per student, with an average of $4,905. Net education expenditures are somewhat lower than education costs for each school, reflecting varying abilities to obtain funding from research and patient care buyers to cover part of education costs. The currently authorized capitation of $800 per student covers 17 percent of average net education expenditures, and actual average capitation of $403 covers 9 percent.

Capitation amounts per student of $1,226, $1,633, and $1,962 would be required to cover 25 percent, 33-1/3 percent, and 40 percent, respectively, of average net education expenditures for schools of podiatry.

Chapter 11

VETERINARY MEDICINE

The veterinarian is trained to diagnose, treat, and control diseases of animals. The field of practice includes responsibilities for helping to conserve livestock resources and preserve the public health. Seventy-three percent of active veterinarians in the United States are in private clinical practice; about 6 percent work in public health or animal disease regulatory activities as employees of Federal, state, or local governments; and approximately 21 percent are in a variety of health related activities in universities, private industry, or the military services.

Veterinarians in private clinical practice are concerned with the treatment and control of diseases and injuries of food-producing animals and pets. Veterinarians usually practice in solo or partnership settings, although there is a trend toward group practice and increasing specialization. Veterinarians in regulatory agencies are responsible for preventing or controlling the spread of domestic animal diseases, many of which are transmissible to man, and for guarding against the importation of animal plagues. Those employed in public health agencies and in the military services are concerned particularly with diseases and environmental hazards to the health of both man and animals. In universities, veterinarians have teaching responsibilities and conduct a relatively large amount of research. Laboratory animal medicine studies are aimed at improving the productivity of basic medical research and studying the naturally occurring diseases of laboratory, zoo, and wildlife species for the knowledge they can contribute to comparable diseases occurring in man.

The Professional Schools

Of the 19 veterinary schools presently operating in the United States, almost half of which have been founded since World War II, 17 are public, five are located on campuses that also have medical schools, and all are components of major universities. Both of the privately-controlled schools receive some state subsidy. The 19 schools are located in 18 states, mostly in the south and midwest. Several of them have entered into regional compacts with surrounding states that have no veterinary school. Under these agreements they give admission preference to residents of those states. Studies to determine the feasibility of opening new schools are being conducted by several states. Table 126 shows the existing schools of veterinary medicine.

Professional Education

Although all colleges of veterinary medicine require at least two years of pre-professional college education, 82 percent of the

TABLE 126

Ownership, Institutional Setting, and Year Founded for Schools of Veterinary Medicine, 1972-73

School	Ownership	Institutional setting	Year
Auburn University School of Veterinary Medicine Auburn, Alabama	Public	University	1907
Tuskegee Institute School of Veterinary Medicine Tuskegee, Alabama	Private	University	1945
University of California School of Veterinary Medicine Davis, California	Public	University	1948
Colorado State University College of Veterinary Medicine and Biomedical Sciences Fort Collins, Colorado	Public	University	1907
University of Georgia School of Veterinary Medicine Athens, Georgia	Public	University	1946
University of Illinois College of Veterinary Medicine Urbana, Illinois	Public	University	1944
Purdue University School of Veterinary Sciences and Medicine Lafayette, Indiana	Public	University	1957
Iowa State University College of Veterinary Medicine Ames, Iowa	Public	University	1879
Kansas State University College of Veterinary Medicine Manhattan, Kansas	Public	University	1905
Louisiana State University School of Veterinary Medicine[a] Baton Rouge, Louisiana	Public	University	1974
Michigan State University College of Veterinary Medicine East Lansing, Michigan	Public	Health science center	1909
University of Minnesota College of Veterinary Medicine St. Paul, Minnesota	Public	Health science center	1947
University of Missouri School of Veterinary Medicine Columbia, Missouri	Public	Health science center	1949
Cornell University New York State Veterinary College Ithaca, New York	Public	University	1896
The Ohio State University College of Veterinary Medicine Columbus, Ohio	Public	Health science center	1885
Oklahoma University College of Veterinary Medicine Stillwater, Oklahoma	Public	University	1947
University of Pennsylvania School of Veterinary Medicine Philadelphia, Pennsylvania	Private	Health science center	1884
Texas A & M University College of Veterinary Medicine College Station, Texas	Public	University	1916
Washington State University College of Veterinary Medicine Pullman, Washington	Public	University	1899

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[a] First entering class January, 1974.

1972 entering class had three or more years of college and 38 percent held a baccalaureate or higher degree.

The four-year curriculum leading to the degree of Doctor of Veterinary Medicine (D.V.M.)* covers principles of comparative biology and medicine, normal and disease states, clinical techniques, and clinical practice. All schools require formal course work in the areas of anatomy, physiology, microbiology, pathology, parasitology and pharmacology to acquaint the student with basic principles of health and disease. Training in the clinical aspects of veterinary medicine occupies most of the latter two years of the professional program. Students gain practical experience by working in college veterinary hospitals under the direction of veterinary clinicians. In several schools, students also have the opportunity to work with local practitioners, but only one school requires a formal undergraduate preceptorship. As a part of the clinical education, all schools require course work in medicine, surgery, and public health. Additional training is given in a number of specialties, business, and law.

Several programs of postdoctoral education are available to D.V.M.s. For those interested in research or teaching, most veterinary colleges offer M.S. or Ph.D. degrees.

Advanced training through formal internships is offered by most veterinary colleges and by a few animal hospitals. Residencies designed primarily for certification by one of ten veterinary medicine specialty boards of the American Veterinary Medical Association are offered by hospitals and some government agencies.

The educational program leading to the D.V.M. prepares the new graduate to enter private practice after passing qualifying examinations for licensure. However, most new graduates serve informal internships in association with private practitioners.

The veterinary profession is increasing its activities in continuing education programs. Ten of the colleges now have full-time directors of continuing education; the 165 programs offered in 1972-73 were attended by 9,773 participants. Three states, Florida, Nebraska and Tennessee, require evidence of continuing education as a condition for renewal of licensure.

All states and the District of Columbia require that a veterinarian pass an examination and be licensed before he can practice in the state. Reciprocity agreements enable some states to recognize licenses granted by another state.

In addition to this license, a veterinarian may, through examination, receive accreditation from the U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service to perform official duties in state and Federal animal health programs and the shipping of livestock. More than 75 percent of U.S. veterinarians are presently accredited by the USDA.

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*Both the D.V.M. and V.M.D. are granted as the first professional degree in veterinary medicine.

Eighteen percent of veterinary college faculty were employed to conduct research as their primary activity in 1972-73. Dollars spent for research by each school vary from about 10 to 50 percent of the schools' total expenditures, with most of the funds coming from the Federal government. The eradication and control of diseases, which cause losses of livestock and poultry to an extent as great as $2.7-billion annually, is the goal of much of the research. Veterinary investigations also help to develop animal models of diseases that occur in man and enable biomedical research to be conducted with less human experimentation.

The total of active veterinarians in the United States--25,902 in 1970--was predominantly in private practice, with the specialties and other occupations distributed as shown in Table 127.

The Sample of Schools

The five schools of veterinary medicine that were selected for study reflect the diversity in geographic location, enrollment, and program characteristics of all the schools. The sample represents 26 percent of all schools in the profession. Table 128 compares the sample and the universe of schools for four key characteristics.

Table 129 shows enrollment and faculty size in the five sampled schools. Although the overall faculty/student ratio is high, averaging about one faculty member for every four students, when that ratio is adjusted for the percent of faculty time spent in instruction of first degree students, the instructional faculty/student ratio is much lower, ranging from one faculty member for every eight students to one for every 13 students.*

Costs of Education**

Education costs per student range from $6,058 to $10,613. The average cost of education is $7,520. A summary of education costs per student for the five schools of veterinary medicine is shown in Table 130.

School 3, a private school located in a health science center, has the highest costs, because of high research costs and other direct costs more than double those at any other school. Two of the four public schools in the sample are in health science centers and two are university based. The two health science center schools, School 1 and School 5, have costs averaging $7,360; costs at the university-based schools are lower, averaging $6,134.

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*Instructional faculty/student ratios are computed by dividing the number of faculty by the number of first degree students and multiplying the result by the average percent of faculty time spent in the instruction of these students.

**Unless otherwise specified, all costs presented in the remainder of this chapter are annual costs.

TABLE 127

Distribution of U.S. Veterinarians by Primary Activity, 1970

Primary activity a/	Number	Percent
Total	25,902	100
Food animal practice	6,242	24
Small animal practice	10,931	42
Equine practice	804	3
Laboratory animal medicine	342	1
Zoo animal practice	40	b/
Wildlife animal practice	14	b/
Public health	276	1
Military veterinary medicine (exclusive of laboratory animal medicine and research)	770	3
Regulatory veterinary medicine (other than meat inspection)	1,227	5
Meat Inspection	1,885	7
Industrial veterinary practice (exclusive of laboratory animal medicine)	506	2
Teaching and research (exclusive of laboratory animal medicine, public health, and industrial veterinary practice)	1,611	6
Other veterinary practice	477	2
Retired	777	3

SOURCE: NAS-NRC, *New Horizons for Veterinary Medicine*, 1972.

a/A primary activity is defined as one in which a veterinarian devoted more than 50 percent of his effort. Most veterinarians are involved in a variety of activities.

b/Less than 1 percent.

TABLE 128

Comparison of Schools in the Sample to Total Number of Veterinary Medical Schools, 1972-73

Key variables	Sampled schools	Total
Organizational relationship		
Public	4	17
Private	1	2
Institutional setting		
Freestanding	-	-
University	2	14
Health science center	3	5
Size of D.V.M. enrollment		
Less than 300	2	9
More than 300	3	10
Geographic distribution		
Northeast	1	2
North Central	1	8
South	2	6
West	1	3

TABLE 129

Characteristics of the Sampled Veterinary Medical Schools, 1972-73

Characteristics	School 1 (Public)	School 2 (Public)	School 3 (Private)	School 4 (Public)	School 5 (Public)
Number of FTE faculty a/	81.1	104.5	110.0	47.6	83.0
Number of D.V.M. students	463	338	348	203	255
Total FTE faculty/D.V.M. student ratio	1:6	1:3	1:3	1:4	1:3
Percent FTE faculty instruction per D.V.M. student	49%	24%	35%	51%	44%
Instructional FTE faculty/ D.V.M. student ratio	1:12	1:13	1:9	1:8	1:7

a/FTE = full-time equivalent.

TABLE 130

Average and Actual Education Costs per Veterinary Medical Student, by Components of Cost, 1972-73

Components of cost	Average costs	Actual costs				
		School 1	School 2	School 3	School 4	School 5
Total education costs	$7,520	$6,597	$6,058	$10,613	$6,209	$8,123
Instruction costs	6,705	6,088	5,439	9,377	5,579	7,042
Faculty salaries	2,050	1,358	1,723	2,213	2,318	2,638
Other direct costs	1,868	1,355	1,392	3,772	1,111	1,708
Clinic costs	1,766	2,559	1,699	2,106	1,327	1,141
Cross subsidies	60	-	-	298	-	-
Indirect costs	961	816	625	988	823	1,555
Research associated with education	815	509	619	1,236	630	1,081

The general methodology used for estimating costs of education in all professions is described in detail in Part III. The specific methodology for schools of veterinary medicine reflects the following assumptions about the relationship between the education, patient care, and research programs in these schools:

- Patient care takes place in teaching hospitals and clinics and is performed primarily by students, with faculty acting as supervisors. Since college-owned clinics are operated principally to meet the needs of the educational program, all clinic costs are included in instruction costs
- Since the clinic supports both D.V.M. and graduate education, clinic costs were allocated to the education costs of D.V.M. students and graduate students on the basis of total non-clinic instruction costs for both types of students
- The constructed cost seminar for D.V.M. education determined that for each hour spent in D.V.M. instruction, a basic science faculty member requires 0.25 hours in research and a clinical faculty member requires 0.10 hours in research. A more detailed analysis of the impact of these judgments on costs is presented in a later section and a description of the constructed cost seminar process and results is presented in Part III.

The allocation of faculty costs to education and other programs is based on an analysis of faculty activities recorded during one week in the spring of 1973. Veterinary medical school faculty kept logs of their activities, then categorized each activity using one of the 13 activity categories defined in Chapter 3, Table 12. A summary of average full-time faculty hours by activity for each school and the average across all five schools appears in Table 131. There is little variation in total faculty workweek, which averages 56 hours. Only at School 3 is the amount of time spent in student contact activities less than 10 hours per week; faculty at this school also spend a relatively small amount of time in preparation for teaching and curriculum development.

The following allocation rules were used to assign faculty costs to programs for each school of veterinary medicine:

- 100 percent of faculty costs of joint teaching and patient care activities with veterinary medical students is allocated to the instruction of first degree students
- 100 percent of the faculty costs of joint research and teaching with veterinary medical students is allocated to first degree student instruction
- General support activities--administration, professional development, and writing--are allocated to programs in proportion to the time assigned to each program for all other activities.

TABLE 131

Average Hours per Week of Full-Time Faculty, by Activity, in Sampled Veterinary Medical Schools, 1972-73

Activity	Average	School 1	School 2	School 3	School 4	School 5
Total a/	56	56	59	51	56	57
Teaching activities						
Teaching	6	7	7	4	7	6
Preparation	8	12	8	3	9	7
Curriculum development	8	9	8	6	8	8
Joint activities						
Joint teaching and patient care	4	3	5	2	6	3
Joint research and teaching	2	1	2	2	2	2
Research activities						
Independent research	10	6	12	14	6	10
Patient care activities						
Patient care	3	3	4	1	3	3
Hospital/clinic administration	2	2	2	2	2	3
Service activities						
Service	7	5	6	8	9	7
General support activities						
Administration	1	2	b/	1	b/	1
Professional development	4	4	4	6	3	5
Writing	1	2	1	2	b/	2

a/Numbers may not add to totals due to rounding of component numbers to the nearest hour

b/Less than 30 minutes

Table 132 shows the average percent distribution of faculty time by program for each school and the average for the sample of veterinary medical schools. This distribution includes full-time and part-time faculty. The data show that instruction of first degree students and research are the major programs at the sampled schools. At four of the five schools, faculty spend more than 40 percent of their time instructing D.V.M. students and more than 65 percent in total instruction. At only one school do faculty spend more time teaching graduate students than they do teaching first degree students. On the average, faculty spend one-fourth of their time in research; at School 3, however, 41 percent of faculty time is devoted to the research program.

Sources of Variation in Education Costs

The major reasons for variation in education costs of schools of veterinary medicine are:

- Non-faculty salaries, which in part reflect the cost of living in different geographic areas
- Research costs per student, which reflect the difference in the total amounts spent for research at each school.

Variation among schools in the faculty costs of instructing candidates for the first degree is explained by differences in faculty salaries* and differences in the instructional faculty/student ratio, which measures the amount of faculty resources devoted to first degree instruction.

The effect of faculty costs on instruction costs can be measured by recomputing instruction costs for each school, holding each one, and then both, faculty cost factors constant at the average level for all schools. The extent to which each of these factors account for total variation in instruction costs can then be measured by changes in the range of instruction costs. Table 133 shows the costs for each factor and the recomputed ranges in instruction costs.

The actual range in instruction costs is $3,938. The following changes in the range were obtained by using average costs:

- Holding faculty salaries constant at the average level increases the range only slightly because the lowest-cost school, School 2, has the highest salaries, and costs at this school are reduced by substituting the average cost for salaries. The average salary for the highest-cost school, School 3, is close to the average salary for all the schools, resulting in a small change in costs at the high end of the range

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*Average faculty salaries are shown on a full-time equivalent (FTE) basis. They are computed by dividing total faculty costs by the number of FTE faculty at each school.

TABLE 132

Distribution of Faculty Time, by Instructional Activities and Programs in Sampled Veterinary Medical Schools, 1972-73

Activities or programs	Average	School 1	School 2	School 3	School 4	School 5
Total	100%	100%	100%	100%	100%	100%
Instruction of first degree students						
Teaching	6	9	3	5	8	6
Joint teaching and patient care	11	16	10	5	14	11
Preparation	8	11	4	7	10	9
Curriculum development	4	3	2	4	8	5
Joint research and teaching	1	1	-	2	3	1
Patient care	9	10	9	7	8	9
Other[a]	10	10	5	11	13	9
Total	49	60	33	41	64	50
Other instruction	20	20	36	14	14	16
Research	25	14	27	41	17	27
Service	6	6	4	4	5	7

NOTE: Includes both full-time and part-time faculty.

a/ Administration, professional development, and writing allocated to first degree instruction.

TABLE 133

Variation in Range of Instruction Costs per Veterinary Medical Student Due to Differences in Faculty Costs, 1972-73

Source of change	Range	Percent reduction (increase)
Range of the sampled schools	$3,938	NA
Range computed by substituting average faculty salary of $19,481 a/	4,173	(6)
Range computed by substituting average instructional faculty/student ratio of one faculty for every nine students b/	4,000	(2)
Range computed by substituting average faculty salary and average instructional faculty/student ratio	3,903	1

a/Actual range in faculty salaries in $15,799 to $23,654.

b/Actual range in instructional faculty/student ratio is one faculty for every seven students to one for every 13 students.

- The range in instruction costs is increased only two percent by holding the instructional faculty/student ratio constant at the average of one faculty member for every nine students. That is because the instructional faculty/student ratio of the highest-cost school is also 1:9, causing no change in its relative position. The two lowest-cost schools, School 3 and School 4, reverse rank positions, but costs at the low end of the range change little

- Holding both factors constant at their average level is equivalent to substituting the average faculty costs per student, $2,050, at each school; this has almost no effect on the range of instruction costs per student. The higher-cost schools have high faculty/student ratios and about average faculty salaries. Although substituting the overall average affects the relative position of each school, it changes the range in education costs only slightly.

Variation in instruction costs are also explained by differences in other direct, indirect, and clinic costs. Other direct costs, especially support staff salaries, indirect costs, and clinic costs per student vary greatly among the five schools of veterinary medicine.

To determine the effect of these factors on instruction costs, the average cost of each factor is substituted for the actual cost in each school, and instruction costs are recomputed. Table 134 shows the results of the analysis:

- The range of costs decreases by 28 percent when average non-faculty salaries are substituted for each school. Support staff salaries were selected as a cost category separate from other direct costs because numbers of support staff and average salaries for support staff vary widely across the schools. The highest-cost school, School 3, has support staff salaries that are more than twice the average; the other four schools have staff salaries slightly below the average. The substitution of average support staff costs decreases costs in the two high-cost schools and increases them in the low-cost schools

- Substituting average other direct operating costs per student of $1,137 reduces the range by 29 percent. At the four public schools, the other direct costs average $861, almost $300 below the average for the five schools, and $1,400 less than the actual costs per student at the highest-cost school.

Direct instruction costs, excluding faculty costs, appear to cause most of the variation in instruction costs per student. The higher support staff salaries and other direct costs at School 3 reflect its urban location.

Variation in education costs not explained by instruction cost

TABLE 134

Variation in Range of Instruction Costs per Veterinary Medical Student Due to Differences in Non-Faculty Costs, 1972-73

Source of change	Range	Percent reduction
Range of the sampled schools	$3,938	NA
Range computed by substituting average non-faculty salary cost of $731[a]	2,820	28
Range computed by substituting the average amount of other direct operating costs of $1,137 [b]	2,782	29
Range computed by substituting average amount of clinic costs of $1,766 [c]	3,742	5
Range computed by substituting the average amount of indirect costs of $961	3,633	8

a/ Actual non-faculty salaries range from $309 to $1,533.
b/ Actual other direct clinic costs range from $556 to $2,239.
c/ Actual clinic costs range from $1,141 to $2,559.

variation is due to differences in institutions' research programs. Average research costs per student of $815 account for about 10 percent of education costs in the sampled schools. Absolute amounts, however, vary from $509 to $1,236 per student. When the costs of research related to education are added to instruction costs, the range increases from $3,938 to $4,555. This is because the two schools with highest instruction costs also engage in the greatest amounts of research.

Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

In computing these expenditures for schools of veterinary medicine, research and clinic revenues are apportioned to first degree education and graduate education programs based on the total instruction costs of these programs. Revenues allocated to the education program for first degree students are then deducted from the education program's costs to produce net education expenditures for veterinary medicine.

Net education expenditures for the five veterinary schools, displayed in Table 135, range from $4,309 to $7,760 per student; the average is $5,538. All the schools generate enough income from patient care activities to cover part of the costs of education; all but one school receive enough income from sponsored research to reduce education costs. Therefore, net education expenditures are lower than education costs in all five schools. The schools maintain the same relative rankings for net education expenditures as they have for education costs, but the range decreases from $4,555 to $3,451.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recomments their use as the basis for setting capitation rates. Table 136 shows the relationship of authorized and actual capitation amounts to net education expenditures for each veterinary medical school in the sample. On the average, about one-third of net education expenditures are covered by authorized capitation amounts while about 15 percent are covered by actual amounts.

Table 137 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in veterinary medicine, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

TABLE 135

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Veterinary Medical Student in Sampled Schools, 1972-73

School	Education costs	Offsetting revenues		Net education expenditures
		Sponsored research	Patient care	
1	$ 6,597	$ 0	$1,536	$5,061
2	6,058	242	1,507	4,309
3	10,613	1,335	1,518	7,760
4	6,209	372	1,327	4,510
5	8,123	1,001	972	6,050
Average	7,520	610	1,372	5,538

TABLE 136

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Veterinary Medical Student in Sampled Schools, 1972-73

School	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
1	$5,061	$1,750	35	$707	14
2	4,309	1,750	41	704	16
3	7,760	1,750	23	860	11
4	4,510	1,750	39	781	17
5	6,050	1,750	29	713	12
Average	5,538	1,750	32	753	14

TABLE 137

Percent of Net Education Expenditures per Veterinary Medical Student Covered at Different Levels of Capitation in Sampled Schools, 1972-73

School	Net education expenditures per student	Capitation at 25 percent of average net education expenditures ($1,385)	Capitation at 33-1/3 percent of average net education expenditures ($1,846)	Capitation at 40 percent of average net education expenditures ($2,215)
1	$5,061	27%	36%	44%
2	4,309	32	43	51
3	7,760	18	24	29
4	4,510	31	41	49
5	6,050	23	31	37

Sources of Income for Schools of Veterinary Medicine

Table 138 shows the percent distribution of 1972-73 income by source for the five schools of veterinary medicine in the sample.

Education income, the largest source of income for all five schools, ranges from 37 to 54 percent of total income. State general appropriations make up the major portion of that amount. Federal capitation funds represent between 3 and 4 percent of total income for the schools.

The second largest source of funds for four of the schools is sponsored research income, which amounts to between 30 to 37 percent of total income at these schools. Patient care income is 19 percent of total income at School 4; at the other schools, it represents 12 percent or less.

Effect of Changes in Research Essential to Education

The judgments regarding research essential to education have a significant effect on education costs. The judgments used in this study represent the consensus of a group of individuals knowledgeable about veterinary medical education. To measure the effect of variations in such judgments on education costs and net education expenditures for each school of veterinary medicine, education costs and net education expenditures were recalculated with a 50 percent increase and a 50 percent decrease in these judgments.

Tables 139 and 140 show that the effect on education costs is small and the effect on net education expenditures is zero in all but one school. In School 1 research revenues are so low that they are not sufficient to cover even the research that is not included in education; therefore increasing the amount required for education, increases the deficit.

Summary

The annual per student cost of educating candidates for the D.V.M. degree ranges from $6,058 to $10,613; the average is $7,520. The highest-cost school is private, part of a health science center, and located in an urban area. The other high-cost school is also located in a health science center. Institutional settings and geographical location appear to affect costs in the sampled schools.

Net education expenditures for schools of veterinary medicine range from $4,309 to $7,760 per student; the average is $5,538. Net education expenditures are lower than education costs for each school, reflecting the ability to obtain funding from research and patient care buyers to cover part of education costs. The currently authorized capitation of $1,750 per student covers 32 percent of average net education expenditures, and the actual average capitation of $753 covers 14 percent.

Capitation amounts per student of $1,385, $1,846, and $2,215 would be required to cover 25 percent, 33-1/3 percent, and 40

TABLE 138

Distribution of Income by Source, in Sampled Veterinary Medical Schools, 1972-73

Income source	School 1 (public)	School 2 (public)	School 3 (private)	School 4 (public)	School 5 (public)
Total	100%	100%	100%	100%	100%
Education income	54	47	37	51	44
Tuition and fees	5	4	9	5	5
Gifts and endowment	a/	a/	6	0	1
Teaching/training grants	6	4	0	0	1
Other institutional support	4	11	0	9	0
State general appropriation	35	25	22	34	37
Federal capitation	4	3	b/	3	b/
Patient care income	10	12	11	19	6
Research income	11	37	31	30	33
Other non-education income	6	0	0	0	0
General university support	19	4	21	0	17

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a/Less than 0.5 percent.
b/Capitation amount not reported separately.

TABLE 139

Percent Change in Education Costs and Net Education Expenditures per Veterinary Medical Student From a 50 Percent Increase in Research Essential to Education, 1972-73

School	Basic science research		Clinical science research		Basic and clinical sciences research	
	Education costs	Net education expenditures	Education costs	Net education expenditures	Education costs	Net education expenditures
1	2%	3%	1%	1%	3%	4%
2	3	0	2	0	5	0
3	4	0	2	0	6	0
4	4	0	0	0	4	0
5	5	0	2	0	7	0

TABLE 140

Percent Change in Education Costs and Net Education Expenditures per Veterinary Medical Student From a 50 Percent Decrease in Research Essential to Education, 1972-73

School	Basic science research		Clinical science research		Basic and clinical sciences research	
	Education costs	Net education expenditures	Education costs	Net education expenditures	Education costs	Net education expenditures
1	2%	3%	2%	2%	4%	5%
2	3	0	2	0	5	2
3	4	0	2	0	6	0
4	4	0	1	0	5	0
5	5	0	2	0	7	0

percent, respectively, of average net education expenditures for schools of veterinary medicine.

Chapter 12

NURSING

The profession of nursing is directed toward the recovery and maintenance of good health. Nursing duties historically have been centered on the comfort and care of patients in accordance with the nurse's training and medical instructions. In recent years, education of nurses has begun to shift their function toward a position of greater responsibility in the treatment of patients.

Formalized nursing education in the United States began in the nineteenth century; the first class of nurses was graduated from the New England Hospital for Women and Children in 1872. The two national associations of nurses--the National League for Nursing (NLN) and the American Nurses' Association (ANA)--were established in the 1890s. The first state registration law for nurses was enacted in 1903, and by 1916, college-based programs leading to a baccalaureate degree in nursing were in operation. There presently are 1,400 state-approved nursing education programs leading to a diploma or a first professional degree.

The Professional Schools

Three types of nursing programs are considered in this study: baccalaureate degree, associate degree, and diploma. The percent distribution of the number of programs and their enrollments during 1972 is shown in Figure 6.

The twenty-year growth trends of graduates in the three types of programs, summarized in Figure 7, shows a recent move away from hospital-based diploma programs and toward those in academic settings. While diploma schools have always supplied the largest percentage of U.S. graduates, many hospital programs are now closing due to an inadequate number of qualified faculty, rising costs, and enrollment vacancies. Within the profession there are some educators who support this reduction as part of the movement to place nursing programs in academic institutions, and others who strongly support the continued need for diploma graduates.

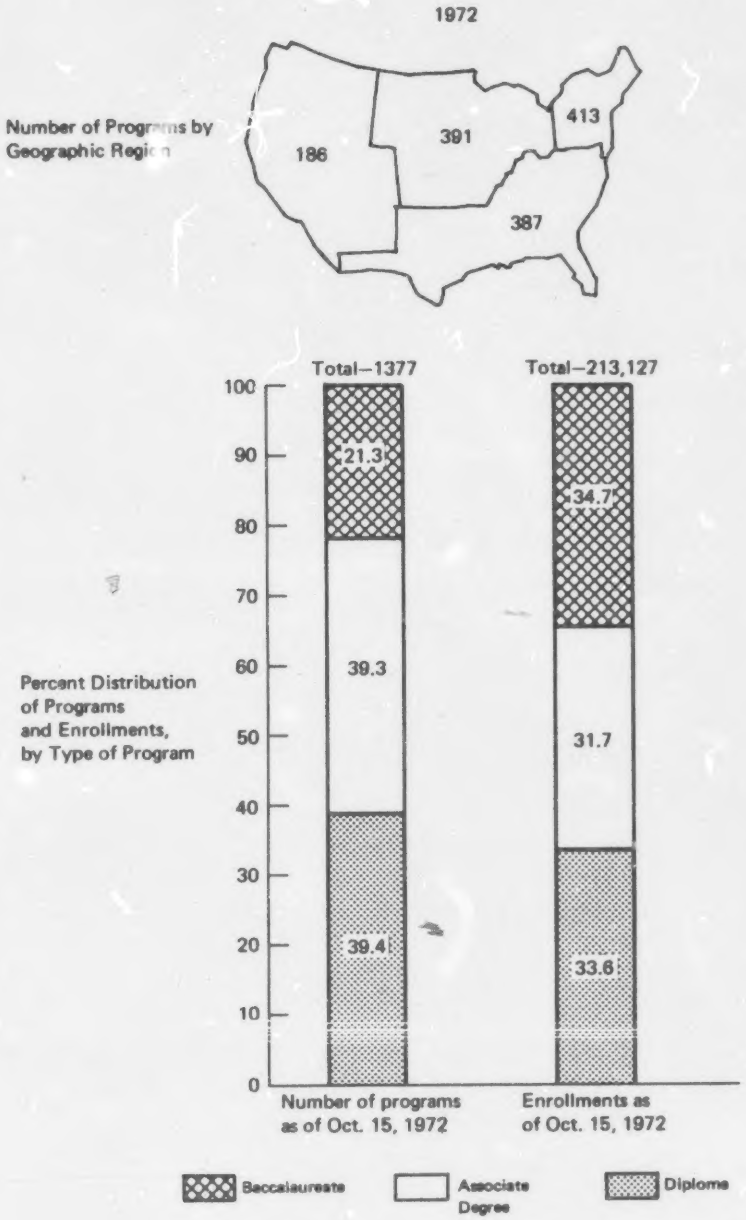
Professional Education

Baccalaureate degree, associate degree, and diploma programs are distinct educational paths for students to take toward eligibility for examination and licensure as registered nurses (R.N.s).

Diploma schools are the oldest of the three types of nursing

FIGURE 6

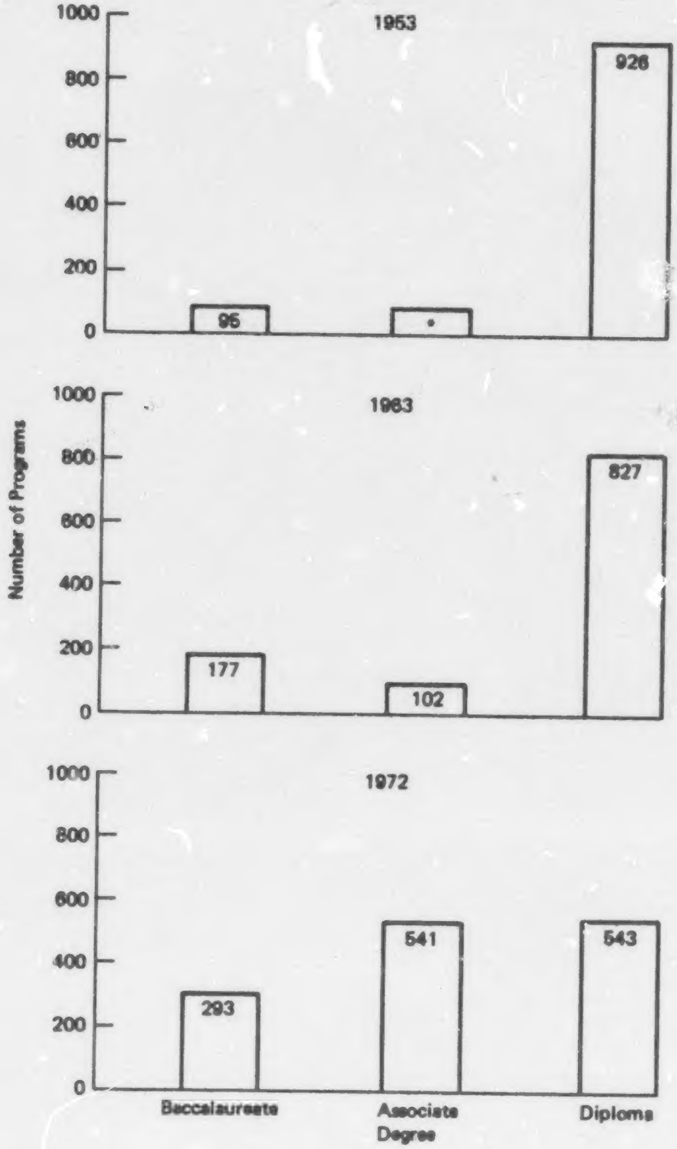
Distribution of State-Approved Nursing Education Programs, 1972



SOURCE: *State-Approved Schools of Nursing, R.N., 1973.*

FIGURE 7

Graduates from State-Approved Programs for Nursing Education, 1953-72



*No seperate figure available

programs. Ninety-seven percent of the diploma programs are hospital based. All of them are two to three years in duration, usually including six months to one year of preclinical education in basic sciences, social sciences, and pre-professional studies such as nutrition, pharmacology, and the history of nursing. The remainder of the curriculum is devoted primarily to clinical and classroom instruction in psychiatric, obstetric, pediatric, and medical-surgical nursing. Students may receive clinical experience in affiliated agencies if the home hospital does not provide services in a particular subject area; psychiatric affiliations are a common example.

Most associate degree programs are based in junior colleges and technical institutes, although a few are located in four-year colleges, universities, and health science centers. About half of the two-year program consists of instruction in basic sciences, social sciences, and humanities, with the remainder devoted to nursing instruction. Clinical experience in a typical associate degree program occupies about two-thirds of the total nursing clock hours in the program* and is obtained at various types of affiliated agencies, including hospitals, visiting nurse associations, and extended-care facilities.

The third type of program leads to a Bachelor of Science degree in nursing. These programs are based in colleges, universities, or health science centers and extend four or five years, including instruction in liberal arts, social sciences, and basic sciences as well as instruction and practical clinical experience in nursing. Clinical experience occupies about two-thirds of the nursing clock hours in the student's total program** and is obtained in the institution's own hospital and affiliated agencies.

Most baccalaureate programs accept high school graduates and diploma or associate degree nurses who wish to earn a bachelor's degree. By means of equivalency tests and examination programs, the latter usually can receive credit for past experience and coursework.

Two distinct systems exist for approving nursing education programs. State boards of nursing approve in-state practical and professional schools of nursing. In addition, the NLN provides voluntary accreditation for practical nursing programs, the three types of professional nursing programs, and higher degree programs. Approximately 72 percent of the state-approved baccalaureate programs, 33 percent of the state-approved associate degree programs, and 85 percent of the state-approved diploma programs presently are accredited by the NLN.

All states and the District of Columbia require that a nurse be licensed in order to practice with the designation R.N. The usual requirements for licensure are graduation from a state-approved nursing program and successful performance on the uniform national State Board Test Pool Examination, which is prepared jointly by the ANA and NLN.

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*Based on site-visit data from eight associate degree nursing programs.

**Based on site-visit data from five baccalaureate nursing programs.

Distribution of Nurses

Of the 1,127,657 registered nurses in the United States in 1972, 778,470, or 69 percent, were professionally active.* Of these, about 750,000 were employed full-time in nursing. Seventy percent were employed by hospitals; 15 percent were in office practice or private duty nursing; and the remaining 15 percent were in public health, occupational health, and nursing education.**

Although the ratio of employed nurses to the U.S. population has increased from 259 nurses per 100,000 in 1956 to 361 per 100,000 in 1972, there are substantial differences in the nurse/population ratio among states. In 1966, in the latest data available, the ratios of registered nurses to population ranged from 133 per 100,000 in Arkansas to 536 in Connecticut.***

The Sample of Schools

Among all the professions in this study, nursing required the largest sample because (1) there are three different modes of first degree education and (2) there are so many nursing education programs. Table 141 compares the sample and the total of schools for four key characteristics.

Although 35 programs were sampled at 33 institutions, this number represents less than 3 percent of the nursing schools in the country. To supplement the data obtained from the site-visits, a nationwide financial survey was conducted by the study group of all nursing schools listed in the 1973 NLN publication, *State-Approved Schools of Nursing--R.N.* Responses were received from 54 percent of the degree schools and 59 percent of the diploma schools. The survey results were in general agreement with average direct costs per student computed from the sampled schools, although the range of costs was considerably wider among the surveyed schools.

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*ANA.

**U.S. Department of Health, Education, and Welfare, Public Health Service. *Health Resources Statistics*. PHS Publication No. 1509. (Washington, D. C.: 1972-73) p. 217.

****Ibid.*, p. 216.

TABLE 141

Comparison of Schools in the Sample to Total Number of Nursing Schools, 1971-72

Key variables	Diploma		Associate degree		Baccalaureate degree	
	Sampled Schools	Total a/	Sampled Schools	Total a/	Sampled Schools	Total a/
Organizational relationship						
Public	1	108	8	495	9	152
Private	12	480	0	47	5	144
Institutional setting						
Junior college/technical institute	0	0	7	408	NA	NA
Freestanding, university based	0	2	1	133	5	292
Health science center	0		0		9	
Independent	0	18	0	1	0	4
Hospital based	13	568	0	0	NA	NA
Accreditation status						
Accredited	13	497	7	181	13	213
Non-accredited	0	91	1	361	1	83
Graduate program status						
With graduate program	NA	NA	NA	NA	11	80b/
Without graduate program	NA	NA	NA	NA	3	216

SOURCE: National League for Nursing (NLN), *State-Approved Schools of Nursing--R.N., 1973*, Pub. No. 19-1479, 1973.

a/Totals are of programs reporting between Oct. 16, 1971 and Oct. 15, 1972.
b/Total number of master's degree programs in nursing schools is 86; total of doctoral programs in nursing schools is 8.

Costs of Education*

Education costs per student equivalent** in the sampled baccalaureate nursing schools range from $1,193 to $4,048; the average cost of education is $2,504. A summary of the actual and average education costs per student equivalent for the 14 baccalaureate nursing programs is shown in Table 142.

The primary methodological difficulty in determining per student costs for the sampled baccalaureate programs lay in collecting enrollment data that would provide a uniform measure of the output of the schools. Consequently, the concept of "student equivalent" was used in place of other measures, such as full-time equivalents, enrollments, or admissions. The student equivalent concept defines that portion of the student population enrolled in the nursing program that is actually consuming nursing school resources in any one year. This distinction is necessary because many students enrolled in the nursing school are taking courses in other schools of the university. The costs of courses that are not directly related to nursing education are not included in education costs.

The allocation of faculty costs to nursing education is based on an analysis of faculty activities recorded during one week in the spring of 1973. Nursing school faculty kept logs of their activities, then categorized each activity using one of the 13 activity categories defined in Chapter 3, Table 12. A distribution of the average full-time faculty hours by activity for the sampled baccalaureate nursing schools is shown in Table 143.

When these activities are distributed to instruction, research, or patient care, all faculty time spent in joint teaching and patient care is allocated entirely to instruction, because faculty consistently indicated that virtually all time spent in clinical experiences is directly related to student instruction. Instruction activities average 97 percent of the total, with approximately 2 percent in research and 1 percent in patient care. Because the latter programs represent such small fractions of the total costs of the baccalaureate nursing programs, research and patient care are included in the instructional program; instruction costs, therefore, are equal to education costs.

Sources of Variation in Education Costs

The major reason for variation in education costs of baccalaureate nursing schools is faculty costs per student due to differences

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*Unless otherwise specified all costs presented in the remainder of this chapter are annual costs.

**Student equivalents, a standardized measure of the student body for baccalaureate and associate degree nursing programs, are computed by dividing the number of credit hours the nursing school teaches annually by the number of nursing credits taken by a typical nursing student at each level in the program.

TABLE 142

Average and Actual Education Costs per Student Equivalent by Components of Cost, in Sampled Baccalaureate Nursing Programs, 1972-73

Components of cost	Average costs	Actual costs													
		School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13	School 14
Total education costs	$2,504	$1,193	$1,413	$1,678	$1,546	$2,149	$1,612	$3,271	$2,551	$2,894	$3,494	$3,930	$4,048	$1,990	$3,290
Instruction costs															
Faculty salaries	1,124	581	795	707	810	1,140	494	1,982	1,433	1,482	1,146	1,422	1,574	951	1,216
Other direct costs	576	120	321	490	470	297	119	510	364	689	1,938	1,252	842	321	333
Indirect costs	774	489	289	448	248	663	990	759	703	713	403	1,108	1,609	717	1,691
Depreciation	31	4	8	33	17	50	9	19	51	10	8	148	23	1	50

TABLE 143

Average Hours per Week of Full-Time Faculty by Activity in Sampled Baccalaureate Nursing Programs, 1972-73

Activities	Average
Total	53
Teaching activities	
Teaching	8
Preparation	17
Curriculum development	6
Joint activities	
Joint teaching and patient care	8
Joint research and teaching	a/
Research activities	
Independent research	1
Patient care activities	
Patient care	a/
Hospital/clinic administration	0
Service activities	
Service	2
General support activities	
Administration	6
Professional development	4
Writing	1
Absence	a/

NOTE: Hours rounded to nearest hour.

a/Less than 30 minutes per week.

in the instructional faculty/student ratio.* Figure 8 shows that there is a direct relationship between the instructional faculty/student ratio and total costs per student equivalent: the higher the instructional faculty/student ratio, the higher the education costs.

Costs per student equivalent were also tested at each of the sampled schools for relationships to a number of other variables:

- Average faculty salary
- Length of program
- Number of clinical affiliates
- Percent of student time spent in clinical experiences
- Academic degrees held by faculty
- Proportion of senior faculty, by rank
- Proportions of full-time and part-time faculty
- Indirect costs as a percent of direct costs
- Percent of faculty time spent in first degree instruction
- Local consumer price index.

None of these factors by itself shows any significant relationship to costs per student equivalent in the sample.

A relationship was found between costs per student equivalent and type of institutional setting. Average costs for the baccalaureate nursing sample are higher for private institutions than for public ones, and higher in health science center settings than in freestanding programs. However, in both cases, the higher average costs correspond to higher average instructional faculty/student ratios. The differences in costs may be attributable more to differences in staffing policies than to higher costs generally associated with private or health science center institutions.

It should be noted that the cost of nursing departments in universities or colleges is higher than the cost of most departments that are not health-related. This is largely because the close supervision of nursing students in patient care settings requires higher faculty/student ratios.

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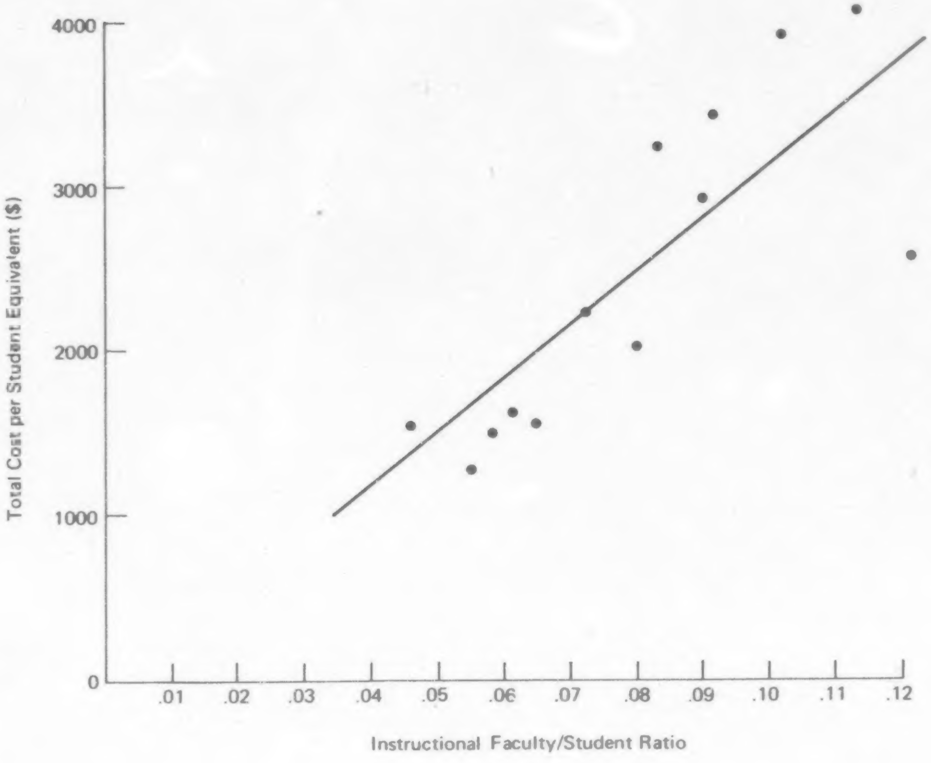
*Instructional faculty/student ratio is computed by dividing the number of faculty by the number of first degree students and multiplying the result by the average percent of faculty time spent in the instruction of these students.

FIGURE 8

Relationship of Instructional Faculty/Student Ratio
to Cost per Student Equivalent in
Sampled Baccalaureate Nursing Programs, 1972-73



Net Education Expenditures

Net education expenditures show the balance of education costs after each school's sponsored research and clinic revenues are subtracted. Net education expenditures, then, represent the net unfunded portion of education costs.

Since the level of sponsored program revenues in baccalaureate nursing programs is extremely small--the average is $45 for the sampled schools--the difference between education costs and net education expenditures is minor, averaging 2 percent. Where differences do occur, they are attributable almost entirely to the research component.

Both education costs and net education expenditures for fourteen baccalaureate nursing programs are displayed in Table 144. The range for both measures is $1,193 to $4,048 per student; the average is $2,504 for education costs, and $2,462 for net education expenditures, a difference of $42.

Relation of Capitation to Costs

Because net education expenditures indicate the amount of financing a school requires from education sources, the study group recommends its use as the basis for setting capitation rates. Table 145 shows the relationship of authorized and actual capitation amounts to net education expenditures for per student equivalents, for each baccalaureate nursing program in the sample.

Table 146 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in baccalaureate nursing, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools.

There is a considerable difference among the schools in the amount of net education expenditures that would be covered when capitation is set at these three levels. Capitation at 25 percent covers from 15 to 52 percent of average net education expenditures; at 33 percent it covers from 20 to 69 percent; and at 40 percent it covers from 24 to 83 percent.

Sources of Income

Table 147 shows the average percent distribution of 1972-73 education income, by source, for the baccalaureate nursing schools in the sample. For all the schools in the sample, tuition and fees are the largest source of revenue, although in public schools, state general appropriations are the biggest income source. Nearly all income is for the educational program.

TABLE 144

Average Education Costs, Offsetting Research and Patient Care Revenues, and Net Education Expenditures, per Student Equivalent in Sampled Baccalaureate Nursing Programs, 1972-73

School a/	Education costs	Offsetting revenues	Net education expenditures
1	$1,193	0	$1,193
3	1,678	$286	1,392
2	1,413	0	1,413
4	1,546	16	1,530
6	1,612	0	1,612
13	1,990	0	1,990
5	2,149	0	2,149
8	2,551	0	2,551
9	2,894	281	2,613
7	3,271	2	3,269
14	3,292	0	3,292
10	3,494	0	3,494
11	3,927	0	3,927
12	4,048	0	4,048
Average	2,504	42	2,462

a/Ranked in order of lowest to highest net education expenditures.

TABLE 145

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures, per Student Equivalent, in Sampled Baccalaureate Nursing Programs, 1972-73

School	Net education expenditures per student equivalent	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
1	$1,193	$ 0	0	$ 0	0
2	1,413	216	15	141	10
3	1,392	264	19	173	12
4	1,530	228	15	150	10
5	2,149	516	24	338	16
6	1,612	345	21	226	14
7	3,269	481	15	315	10
8	2,551	625	25	409	16
9	2,613	400	15	262	10
10	3,494	513	15	336	10
11	3,927	262	7	172	4
12	4,048	296	7	194	5
13	1,990	168	8	110	6
14	3,292	180	6	118	4
Average	2,462	346 a/	14 a/	226 a/	9 a/

a/Average is calculated on the basis of schools that applied for and received capitation grants.

TABLE 146

Percent of Net Education Expenditures per Student Covered at Different Levels of Capitation in Sampled Baccalaureate Nursing Programs, 1972-73

School a/	Net education expenditures per student equivalent	Capitation at 25% of average net education expenditures ($615)	Capitation at 33-1/3% of average net education expenditures ($821)	Capitation at 40% of average net education expenditures ($985)
1	$1,193	52	69	83
3	1,392	44	59	71
2	1,413	44	58	70
4	1,530	40	54	64
6	1,612	38	51	61
13	1,990	31	41	50
5	2,149	29	38	46
8	2,551	24	32	39
9	2,613	24	31	38
7	3,269	19	25	30
14	3,292	19	25	30
10	3,494	18	23	28
11	3,927	16	21	25
12	4,048	15	20	24

a/Ranked in order of lowest to highest net education expenditures.

TABLE 147

Average Distribution of Education Income by Source in Sampled Baccalaureate Nursing Programs, 1972-73

Source of income	Average for public schools	Average for private schools	Average for both public and private schools
Total	100%	100%	100%
Tuition and fees	20	60	37
Gifts and endowments	a/	6	3
Teaching/training grants	9	22	14
State general appropriations	56	1	33
Federal capitation	8	10	9
Other sources	6	2	4

a/Less than 0.5 percent.

Associate Degree Programs

Costs of Education

Education costs per student equivalent for associate degree nursing range from $1,065 to $2,130. The average cost of education is $1,665. A summary of the education costs for the eight associate degree programs in the sample is shown in Table 148. The methodology used for computing education costs for associate degree nursing programs is identical to that used for baccalaureate programs.

Table 149 provides a distribution of the average full-time faculty hours by activity for the sampled schools. When the time spent in these activities is distributed to instruction, research, or patient care, all faculty time spent in joint teaching and patient care, or in research is allocated to instruction. Thus, as in baccalaureate nursing, 100 percent of faculty time is defined as instruction, and costs in each school are identical to education costs.

Unlike other types of nursing programs, the sampled associate degree programs receive virtually no income from sponsored research or patient care. Hence, there were no offsetting financial adjustments to education costs, and net education expenditures are identical with instruction and education costs for the schools.

Sources of Variation in Education Costs

As in baccalaureate nursing, the major reasons for variation in education costs of associate degree programs are faculty costs per student resulting from differences in the instructional faculty/student ratio. Figure 9 shows that there is a direct relationship between the instructional faculty/student ratio and total costs per student equivalent.

Other variables tested at each of the sampled schools for relationships to costs per student equivalent included:

- Average faculty salary
- Local consumer price index
- Number of clinical affiliates for the school
- Length of program
- Faculty size
- Percent of time spent in clinical experiences
- Indirect cost as a percentage of direct cost.

None of these factors indicate any significant relationship to cost per student equivalent.

TABLE 148

Average and Actual Education Costs per Student Equivalent by Components of Cost, in Associate Degree Nursing Programs, 1972-73

Components of cost	Average costs	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8
Total education costs	$1,665	$1,065	$1,217	$1,523	$1,601	$1,851	$1,959	$1,971	$2,130
Instruction costs									
Faculty salaries	895	541	925	1,029	768	1,213	1,020	932	728
Other direct costs	207	166	133	144	143	194	307	315	251
Indirect costs	553	357	150	332	655	432	622	723	1,151
Depreciation	11	2	9	18	34	12	10	1	0

TABLE 149

Average Hours per Week of Full-Time Faculty by Activity in Sampled Associate Degree Programs, 1972-73

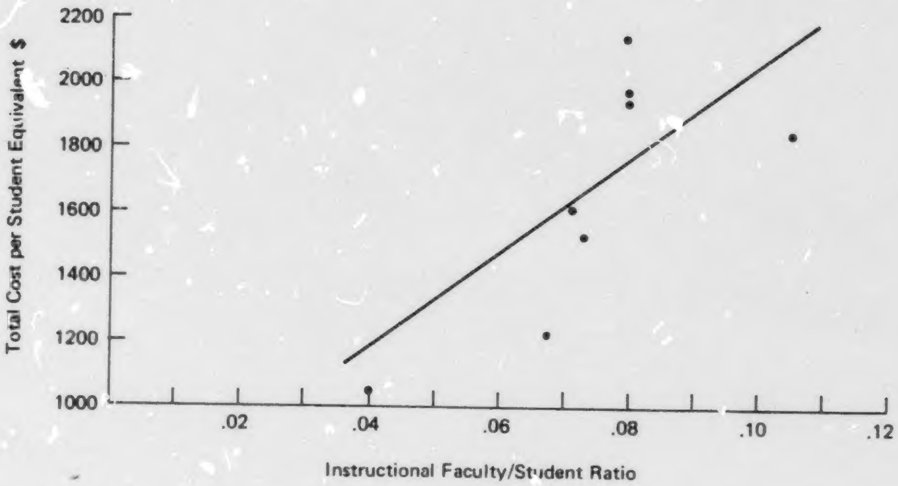
Activities	Average
Total	55
Teaching activities	
Teaching	8
Preparation	21
Curriculum development	7
Joint activities	
Joint teaching and patient care	9
Joint research and teaching	0
Research activities	
Independent research	1
Patient care activities	
Patient care	0
Hospital/clinic administration	0
Service activities	
Service	1
General support activities	
Administration	3
Professional development	4
Writing	a/
Absence	1

NOTE: Hours rounded to the nearest hour.

a/Less than 30 minutes per week.

FIGURE 9

Relationship of Instructional Faculty/Student Ratio to Cost per Student Equivalent in Sampled Associate Degree Nursing Programs, 1972-73



Relation of Capitation to Cost

Table 150 shows the relationship of authorized and actual capitation amounts to net education expenditures per student equivalent for the sampled associate degree nursing program. For the four schools receiving capitation support, the size of the grant ranges from $72 to $219 per student equivalent, or from 5 to 12 percent of net education expenditures. The authorized amount of $250 per full-time student translates into an average of $213 per student equivalent.

Table 151 shows the amounts of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in associate degree nursing, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools. There is a considerable difference in the amount of net education expenditures covered when capitation is set at these three levels. At 25 percent, the amount covered ranges from 20 to 39 percent of average net education expenditures; at 33 percent it ranges from 26 to 52 percent; and at 40 percent it ranges from 31 to 63 percent.

Sources of Income

Table 152 shows the percent distribution of 1972-73 income, by source for the five public programs of associate degree nursing for which income data were available. Except for School 3, virtually all revenue is generated for the educational program. Although tuition and fees average 25 percent of total income, the largest source of support for associate degree programs is the combined assistance provided by state and local governments. On the average, 62 percent of total income comes from these sources, with the state share being the largest in every case. Federal capitation support is significant only in School 4 where it represents 23 percent of income.

Diploma Programs

Costs of Education

Education costs per student* for diploma nursing range from $1,868 to $4,855 in 1972-73; the average cost of education is $3,301. A summary of the education costs for the 13 diploma nursing programs sampled is shown in Table 153.

A different methodology was used to compute the education costs for diploma nursing schools than for the other types of nursing programs. Because the Medicare reporting requirements represent a well-established, uniform cost-finding and reporting system that is

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*Costs per student in diploma nursing are based on full-time student enrollment rather than student equivalents; the number of part-time students enrolled in diploma programs is negligible.

TABLE 150

Authorized and Actual Capitation Levels as a Percent of Net Education Expenditures per Student Equivalent, in Sampled Associate Degree Nursing Programs, 1972-73

School a/	Net education expenditures per student equivalent	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
1	$1,065	$110	10	$ 72	7
7	1,217	0	0	0	0
2	1,523	249	16	163	11
3	1,601	0	0	0	0
4	1,851	334	18	219	12
5	1,959	0	0	0	0
8	1,971	157	8	103	5
6	2,130	0	0	0	0
Average	1,665	213b/	13	139b/	8

a/Ranked in order of lowest to highest net education expenditures.
b/Average is calculated on the basis of schools that applied for and received capitation grants.

TABLE 151

Percent of Net Education Expenditures per Student Equivalent
Covered at Different Levels of Capitation
in Sampled Associate Degree Nursing Programs, 1972-73

School a/	Net education expenditures per student equivalent	Capitation at 25 percent of average net education expenditures ($416)	Capitation at 33-1/3 percent of average net education expenditures ($555)	Capitation at 40 percent of average net education expenditures ($666)
1	$1,065	39%	52%	63%
7	1,217	34	46	55
2	1,523	27	36	44
3	1,601	26	35	42
4	1,851	22	30	36
5	1,959	21	28	34
8	1,971	21	28	34
6	2,130	20	26	31

a/Ranked in order of lowest to highest net education expenditures.

TABLE 152

Distribution of Income by Source, in Sampled Associate Degree Nursing Programs, 1972-73

Income source	School 1	School 2	School 3	School 4	School 5
Total	100%	100%	100%	100%	100%
Education income-subtotal	100	99	91	100	99
Tuition and fees	28	19	23	21	33
Local funds	28	33	0	16	25
State general appropriations	36	33	68	36	36
Federal general appropriations	0	2	0	4	5
Federal capitation	8	12	0	23	0
Patient care income	0	0	0	0	0
Research income	0	0	0	0	0
Other non-education income	0	0	9	0	0
General institutional support	0	1	0	0	1

TABLE 153

Average and Actual Education Costs per Student, by Components of Cost, in Diploma Nursing Programs, 1972-73

Components of cost	Average costs	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13
Total education costs[a/]	$3,301	3,177	4,855	3,062	3,195	3,269	3,415	4,030	2,301	1,868	2,745	4,650	2,949	3,392
Instruction costs														
Faculty Salaries	1,756	1,785	2,756	1,709	1,453	1,739	1,885	2,131	1,296	1,183	1,402	2,432	1,260	1,796
Other direct costs	404	218	805	423	861	220	326	616[b/]	174	125	324	379	483	302
Indirect costs	1,017	1,116	1,272	898	794	984	1,101	1,283	672	516	905	1,601	970	1,106
Depreciation	124	58	22	32	87	326	103	[b/]	159	44	114	238	236	188

[a/] These numbers excluded instruction costs allocated to other than diploma school students in six schools. These amounts were subtracted from faculty salaries in the following schools: School 4, $13; School 5, $17; School 6, $50; School 11, $118; School 12, $12; and School 13, $15.

[b/] Depreciation cost, equal to $36, has been included in other direct costs.

used by hospitals across the country, the Medicare cost-finding framework for the schools' parent hospitals was used as the basis for determining per student costs. In this system, the direct costs of the diploma nursing school (and occasionally of the nurses' residence as well), are itemized as a distinct "cost center" and include neither patient care nor research costs. Detailed guidelines provide for a relatively uniform apportionment of certain hospital costs to the nursing school cost center.

Medicare reimbursement regulations prohibit the imputation of costs for services that traditionally have been rendered on a purely volunteer basis without expectation of any form of reimbursement.* Consistent with these regulations, the study group did not impute costs for services that incurred no expenditures, such as the work of volunteer faculty.

As in the degree programs, all of the schools in the diploma school sample submitted faculty activity reports. A distribution of the average full-time faculty hours, by activity, for the sampled schools is shown in Table 154.

When these activities are distributed to instruction, research, or patient care, all faculty time spent in joint teaching and patient care is allocated entirely to instruction; faculty consistently indicated that virtually all time spent in clinical experiences is directly related to student instruction. Instructional activities average 96 percent of the total with less than 1 percent in research and 3 percent in patient care. Because these latter two activities are such small fractions of the total costs of the diploma nursing programs, they are included in the instruction program and instruction costs in each school are identical to education costs. As Table 155 shows, only 6 of the 13 diploma nursing schools sampled report any difference between instruction and education costs per student due to research and patient care activities of the faculty.

Sources of Variation in Education Costs

The expenditures for diploma nursing schools differ in several ways from those of degree programs. Historically, diploma schools provide their students with certain services--books, uniforms, meals, laundry, residence--that are personal expenditures for degree students. In recent years, however, many of the diploma schools have started to charge the students for these support costs. The diploma sample includes a mixture of schools that either provide service items free to students, provide the items through fees collected from students, subsidize the costs of the items, or make all such items the student's responsibility. The definition of education costs for this study excluded institutional expenditures for meals and residence, but included the costs for other student support services.

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*U.S. Department of Health, Education, and Welfare, Social Security Administration, *Health Insurance for the Aged, Provider Reimbursement Manual*, p. 73.

TABLE 154

Average Hours per Week of Full-Time Faculty by Activity in Sampled Diploma Nursing Programs, 1972-73

Activities	Average
Total	51
Teaching activities	
Teaching	5
Preparation	15
Curriculum development	7
Joint activities	
Joint teaching and patient care	12
Joint research and teaching	0
Research activities	
Independent research	a/
Patient care activities	
Patient care	a/
Hospital/clinic administration	a/
Service activities	
Service	3
General support activities	
Administration	1
Professional development	7
Writing	0
Absence	1

NOTE: Hours rounded to nearest hours.

a/Less than 30 minutes per week.

TABLE 155

Education Costs per Student, by Components of Instruction Costs, in Selected Diploma Nursing Schools, 1972-73

School	Instruction costs	Research costs associated with instruction	Patient care costs associated with instruction	Total education costs
4	$2,746	$ 0	$449	$3,195
5	3,142	34	93	3,269
7	4,009	0	21	4,030
8	2,276	0	25	2,301
10	2,718	0	27	2,745
11	4,629	21	0	4,650

Many diploma nursing schools also maintain social, recreational, health, administrative, and similar services that are regarded as university overhead activities for a degree nursing school. This means that in some cases a diploma nursing school may have a full-time social director on its payroll, or may have included the costs of recreational facilities in its direct expenses. Since the study group's diploma sample includes schools that fully support several such activities and schools that support very few, one element in cost variation relates to this factor.

Another large cost element that is treated in various ways by the diploma nursing schools is the student's general education in the basic sciences, social sciences, and humanities. At one extreme is a sample school whose students take all required general education courses at a nearby college, with the students paying college tuition and fees directly to the college. At the other extreme is a school that maintains its own complete staff of instructors to teach general education courses. These different institutional arrangements may produce very different education costs.

The most important direct cost component affecting education costs are instruction salaries,* which on the average account for over 75 percent of direct diploma nursing school expenditures per student in the sampled schools. Total instruction costs range from $1,281 to $3,448, paralleling the range in instruction salaries ($1,156 to $2,647). This information is displayed in Table 156, which also provides data on the range of direct costs by cost component.

The major reason for variation in education costs among diploma nursing schools is the level of faculty costs per student due to differences in the faculty/student ratio. Figure 10 shows that there is a direct relationship between the faculty/student ratio and total costs per student; the higher the faculty/student ratio, the higher the education cost.

Several other variables were tested at each of the sampled schools for relationships to costs per student. These included:

- Nursing school indirect costs to direct costs per student
- Costs per student to bed size of parent hospital
- Faculty/student ratio to direct per student costs
- Average faculty salary to faculty salary costs per student
- Faculty/student ratio with average faculty salary.

None of these factors by itself shows any significant relationship to costs per student calculated for the sampled schools.

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*Includes teaching faculty, administrative, secretarial, clerical, and support staff salaries.

TABLE 156

Average and Range of Direct Costs per Student, by Components of Costs, in Sampled Diploma Nursing Programs, 1972-73

Cost components	Average	Range
Total direct costs a/	$2,178	$1,308 - 3,561
Total instruction costs	2,000	1,281 - 3,448
Salaries and wages	1,677	1,156 - 2,647
General supplies and expense b/	130	38 - 324
Contracted professional services	11	0 - 54
Student books	17	0 - 83
Student uniforms	10	0 - 68
Scholarships to nurses	3	0 - 22
Tuition paid to universities	99	0 - 429
Fees paid to affiliates	44	0 - 379
Social and recreational activities	9	0 - 28
Total student support	95	0 - 161
Student health	55	0 - 180
Guidance and counseling	23	0 - 81
Other salaries and wages c/	17	0 - 84
Total other items d/	83	0 - 341

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a/Total direct costs are the sum of faculty salaries and other direct costs.

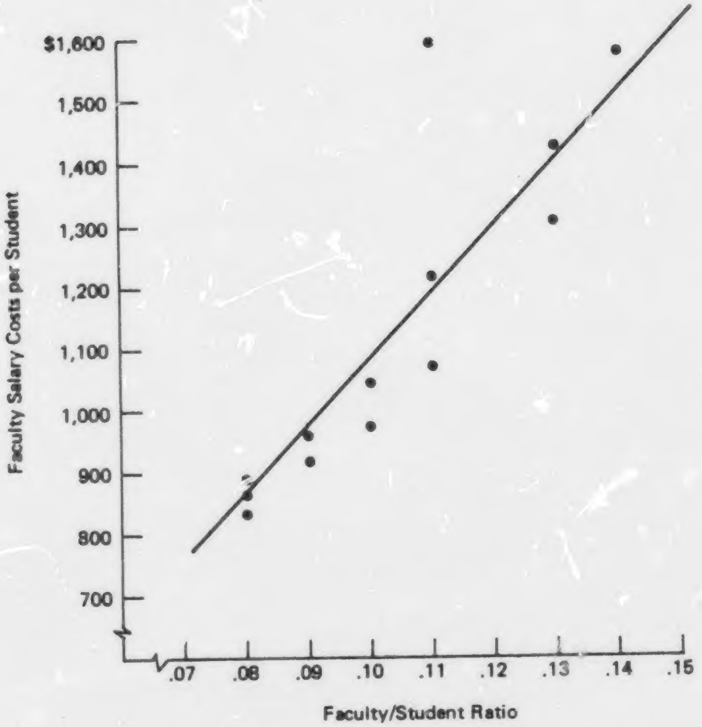
b/Includes costs for library, instructional aides and equipment, office supplies, membership dues, faculty and student travel.

c/Includes items such as recreation and choral directors.

d/Includes items such as housekeeping, utilities costs, F.I.C.A. Tax, etc.

FIGURE 10

Relationship of Faculty/Student Ratio to Cost per Student in Sampled Diploma Nursing Programs, 1972-73



Diploma schools that are hospital based usually have no control over the amount of indirect expenses allocated to them. All other things being equal, if the hospital's maintenance and operating costs increase from one year to the next, the nursing school's allocated portion of these costs can also be expected to increase. The age of the parent institution's physical plant, its historical cost, and the accounting method for depreciation directly affects the amount of depreciation expense charged to the nursing school.

Net Education Expenditures

Unlike degree schools, diploma nursing schools are supported in large part by patient care income derived from cost reimbursement by third-party payers such as Medicare. An average of 63 percent of the income of the diploma schools sampled is generated by third-party payments. Varying amounts of patient care reimbursement account for most of the differences between education costs and net education expenditures for each school, and the differences in net education expenditures among the sampled schools. These data are displayed in Table 157.

Relation of Capitation to Costs

The relationship of authorized and actual capitation amounts to net education expenditures per student, for diploma nursing programs, is displayed in Table 158. Net education expenditures are much lower than education costs in some diploma nursing programs; the $250 authorized capitation would cover 65 percent of the lowest school's net education expenditures. However, at average net education expenditures of $1,522 only 16 percent would be covered. Actual capitation does vary substantially from authorized capitation in those schools that receive awards; the amount of net education expenditures covered by actual capitation averages 14 percent, with a range from 8 to 29 percent.

Table 159 shows the amount of capitation that would be required to cover 25 percent, 33-1/3 percent, and 40 percent of average net education expenditures in diploma nursing programs, and the percent of net education expenditures that would be covered by these amounts in each of the sampled schools. There is a considerable difference in the amount of net education expenditures covered at the schools when capitation is set at these levels. At 25 percent, the amount of average net education expenditures covered ranges from 15 to 99 percent; at 33-1/3 percent, it ranges from 20 to 133 percent; and at 40 percent, it ranges from 24 to 159 percent.

Sources of Income

Table 160 shows the percent distribution of 1972-73 income, by source, for the diploma nursing schools in the sample. For all the schools in the sample, patient care revenues constitute the largest source of income, although in Schools 8 and 9, tuition and fee income is greater than the patient care payments. Federal capitation is a relatively minor source of income in most of the sampled diploma schools; it ranges as high as 10 percent in School 12.

TABLE 157

Average Education Costs, Offsetting Patient Care Revenues, and Net Education Expenditures, per Student, in Sampled Diploma Nursing Programs, 1972-73

School a/	Education costs	Offsetting revenues	Net education expenditures
		Patient care	
6	$3,415	$3,033	$ 382
3	3,062	2,269	793
1	3,177	2,199	978
5	3,269	2,243	1,026
7	4,030	2,922	1,108
9	1,868	597	1,271
4	3,195	1,674	1,521
8	2,301	509	1,792
10	2,745	815	1,930
2	4,855	2,818	2,037
12	2,949	798	2,151
13	3,392	1,128	2,264
11	4,650	2,121	2,529
Average	3,301	1,779	1,522

a/Ranked in order of lowest to highest net education expenditures.

TABLE 158

Authorized and Actual Capitation Levels as a Percent of Average Net Education Expenditures per Student, in Sampled Diploma Nursing Programs, 1972-73

School a/	Net education expenditures per student	Authorized capitation		Actual capitation	
		Amount	Percent	Amount	Percent
6	$ 382	$250	65	$ 0	0
3	793	250	32	0	0
1	978	250	26	285	29
5	1,026	250	24	235	23
7	1,108	250	23	0	0
9	1,271	250	20	0	0
4	1,521	250	16	209	14
8	1,792	250	14	152	8
10	1,930	250	13	0	0
2	2,037	250	13	0	0
12	2,151	250	12	189	9
13	2,264	250	11	0	0
11	2,529	250	10	NA	NA
Average	1,522	250	16	214 b/	14 b/

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a/Ranked in order of lowest to highest net education expenditures.

b/Average is calculated on the basis of schools that applied for and received capitation grants.

TABLE 159

Percent of Net Education Expenditures per Student Covered at Different Levels of Capitation in Sampled Diploma Nursing Programs, 1972-73

School	Net education expenditures per student	Capitation at 25% of average net education expenditures ($380)	Capitation at 33-1/3% of average net education expenditures ($507)	Capitation at 40% of average net education expenditures ($609)
6	$ 382	99%	133%	159%
3	793	48	64	77
1	978	39	52	62
5	1,026	37	49	59
7	1,108	34	46	55
9	1,271	30	40	48
4	1,521	25	33	40
8	1,792	21	28	34
10	1,930	20	26	32
2	2,037	19	25	30
12	2,151	18	24	28
13	2,264	17	22	27
11	2,529	15	20	24

TABLE 160

Distribution of Income by Source in Sampled Diploma Nursing Programs, 1972-73

Source of income	Average costs	School 1	School 2	School 3	School 4	School 5	School 6	School 7	School 8	School 9	School 10	School 11	School 12	School 13
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Education income	37	21	27	34	45	29	15	20	64	61	50	22	55	44
Tuition and fees a/	28	11	27	24	37	22	3	20	38	47	48	18	32	41
Gifts and endowments	1	0	0	0	1	0	0	0	15	0	2	0	0	3
Teaching/training grants	3	0	0	10	0	0	12	0	0	14	0	4	1	0
State general appropriations	1	0	0	0	0	0	0	0	11	0	0	0	12	0
Federal capitation	4	10	0	0	7	7	0	0	0	0	0	0	10	0
Patient care income b/	63	79	73	66	55	71	85	80	36	39	50	78	45	56

a/Includes fees for room and board.
b/Cost-contract reimbursement by third-party payers of nursing school costs only.

Summary

The annual per student cost of educating nurses has been calculated for baccalaureate, associate degree, and diploma nursing programs during 1972-73. For both education costs and net education expenditures, the range and the average for each type of program are summarized in Table 161.

The difference between education costs and net education expenditures is significant only for diploma nursing programs, which generate substantial revenues from patient care.

In Fiscal Year 1972-73, 820 first degree or diploma nursing programs, or about 60 percent of the total, applied for and received capitation awards. This total includes 263 diploma programs (about 48 percent of all diploma programs), 311 associate degree programs (about 57 percent of all associate degree programs), and 246 baccalaureate programs (about 84 percent of all baccalaureate programs).*

At current authorization levels, capitation covers 14 percent of the average net education expenditures in baccalaureate nursing, 13 percent in associate degree programs, and 16 percent in diploma schools. Actual average capitation in 1972-73 covered between 8 and 14 percent of net education expenditures in the three types of schools.

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*Bureau of Health Resources Development, Division of Nursing.

TABLE 161

Average and Range of Education Costs and Net Education Expenditures, per Student in Stampled Nursing Education Programs, 1972-73

Program	Education costs		Net education expenditures	
	Average	Range	Average	Range
Baccalaureate[a]	$2,504	$1,193-$4,048	$2,462	$1,193-$4,048
Associate[a]	$1,665	$1,065-$2,130	Equal to education costs	
Diploma	$3,301	$1,868-$4,855	$1,522	$ 382-$2,529

a/Per student equivalent.

GLOSSARY

ACTIVITY ANALYSIS. The procedure used by the study group to determine proportions of time spent by faculty and house officers in various activities during a specified period, which in this study was one week.

ACTIVITY CATEGORIES. The major groups into which faculty and house officer activities were condensed for further analysis.

CAPITATION GRANTS. A form of government financial support for health professional schools on the basis of their number of students or graduates.

CLINIC COSTS. *See* COSTS, CLINIC.

CONSTRUCTED COSTS. *See* COSTS, CONSTRUCTED.

COSTS, CLINIC. The direct operating costs of the educational clinics in dentistry, optometry, podiatry, and veterinary medicine.

COSTS, CONSTRUCTED. Refer to the methodology and results obtained by convening panels of administrators and educators in health professions to construct resource requirements for education programs for schools of medicine, dentistry, and veterinary medicine. Judgments of these panels were used in defining amounts of research and patient care deemed necessary for education.

COSTS, EDUCATION. The total annual costs of all the resources required to educate students: instruction, research activities considered essential to education, and patient care activities considered essential to education.

COSTS, FACULTY. The total amount of faculty compensation from all sources, including patient care payments.

COSTS, HISTORICAL. The actual resource costs incurred during a specified period of time.

COSTS, IMPUTED. The value of resources for which the school does not make an actual cash outlay. Depreciation of facilities is the only imputed cost included in the cost totals of this report.

COSTS, INDIRECT. From portions of such support functions as general administration, library, and student services.

COSTS, INSTRUCTION. The costs of activities undertaken by a school primarily for the education of students. They include lectures, seminars, counseling; that portion of research and patient care conducted in an educational setting and in the presence of students; and portions of administration, faculty development, and other scholarly pursuits that contribute to all the programs in a school.

COSTS, MARGINAL. The costs of expanding existing programs to produce an additional unit or output.

COSTS, NORMATIVE. The costs that "should be," without regard to economic or financial constraints.

COSTS, OTHER DIRECT. Include all departmental cost items, such as secretarial and clerical salaries, technical staff salaries, and supplies and expenses.

COSTS, RESOURCE. Economic costs of producing the program or product whether or not they are represented by cash transfers.

EDUCATION COSTS. *See* COSTS, EDUCATION.

FACULTY COMPENSATION. Includes faculty professional earnings from all sources, including salary paid by the school and patient care payments made through the school or through a private practice plan.

FACULTY COSTS. *See* COSTS, FACULTY.

FIRST DEGREE STUDENTS. Those studying for their first health professional degree.

FREESTANDING SCHOOLS. Institutions operating by themselves, apart from either a health science center or university campus.

GRADUATE STUDENTS. Include masters degree and Ph.D. candidates.

HEALTH SCIENCE CENTERS. Comprise a school of medicine, a school of nursing, and at least one other health professional school in the same administrative unit.

HISTORICAL COSTS. *See* COSTS, HISTORICAL.

HOUSE OFFICERS and HOUSE STAFF. Interns and residents.

IMPUTED COSTS. *See* COSTS, INPUTED.

INCOME. The funds received by a school from state appropriations, tuition fees, patient care payments, Federal and other research and training grants, and endowments.

INDIRECT COSTS. *See* COSTS, INDIRECT.

INSTRUCTIONAL FACULTY/STUDENT RATIO. A measure of faculty resources used in the instruction of first degree students, computed by dividing the number of faculty by the number of first degree students and multiplying by the percent of time spent by faculty in the instruction of first degree students.

INSTRUCTION COSTS. *See* COSTS, INSTRUCTION.

JOINT ACTIVITIES. Those of faculty and house officers from which more than one product results; e.g., a ward round with students instructs students and provides patient care.

MARGINAL COSTS. *See* COSTS, MARGINAL.

NET EDUCATION EXPENDITURES. Education costs minus the portions of those costs that are funded from research or patient care sources. They do not represent a resource cost concept in the economic sense; they are the remainder after reimbursements for sponsored research and patient care activities are deducted from education costs.

NORMATIVE COSTS. *See* COSTS, NORMATIVE.

OTHER DIRECT COSTS. *See* COSTS, OTHER DIRECT.

PROGRAMS. The three principal pursuits of health professional schools: education, research, and patient care. Community service was regarded as a fourth program in optometry, pharmacy, and veterinary medicine.

PROJECT GRANTS. Support efforts toward a specific outcome, such as a change in curriculum.

RESOURCE COSTS. *See* COSTS, RESOURCE.

SPONSORED RESEARCH. Paid for by sponsors apart from the school, such as Federal and state governments and foundations.

STANDARD DEVIATION. A measure of the amount of variation in a set of data, is defined as the positive square root of the average of the squares of deviations from the mean.

STUDENT EQUIVALENTS. A standardized measure of the student body for baccalaureate and associate degree nursing programs, are computed by dividing the number of credit hours the nursing school teaches annually by the number of nursing credits taken by a typical nursing student at each level in the program.

TIME LOG. A faculty member's record of time spent in different activities.

UNIVERSITY BASED. Refers to schools that are not part of health science centers but are located on a campus with other non-health professional schools.

Institute of Medicine

Study of Costs of Education in the Health Professions

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